THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
May 25, 1987 · Vol. XXI · No. 21 · $2/Copy · $44/Year

COMPUTERWORLD

INSIDE

In Depth — J. Daniel Couger spots some high returns on investment. **Page 67.**

Spotlight — New architectures have turned PC compatibility into a moving target, but both buyers and sellers are concentrating on immediate needs. Center pullout section.

AIDAPSO and the IIA will merge to form an association of nearly 1,400 vendors. Page 2.

NCR and Intel pull out of National Computer Conference while organizers pare down exhibit space. Page 6.

Conversion to 3½-in. PC diskette format offers an opportunity to weed out pirated software. Page 6.

Defense contractors counter MRP charges, call instead for rewriting of regulations. Page 9.

NEC steps up its attack on the PC market with 80386 systems and new Multisynch monitors. Page 10.

Systems based on the 80386 to highlight next week's Comdex/Spring '87. Pages 14-15.

MCI plans to deliver Disoss-generated documents to telex terminals worldwide. Page 13.

Uccel encounters delays in delivering its Infoloans integrated banking package. Page 18.

IBM carves path to high-end CPUs

Woos 370 users with price/performance boost, graduated MVS/XA fees

BY JAMES CONNOLLY and CHARLES BABCOCK
CW STAFF

NEW YORK — IBM last week combined its introduction of five small mainframe models with graduated pricing for its MVS/XA operating system.

The two moves will make it more attractive for mid-range 370 architecture users to enter IBM's most advanced production environment, although upgrading from their entry point may put them in a combined hardware-and-software pricing squeeze, observers said.

The new models of the 4381 and 3090, along with the graduated pricing options for MVS/XA, are expected to offer incentives to MVS/XA shops to distribute the operating system in a wider arc through the corporation, moving it down to smaller processors that will frequently be located farther away from the data processing center, analysts predicted.

However, Kimball Brown, an analyst for Dataquest, Inc., a San Jose, Calif., market research firm, termed the new low-end 3090 Model 120E "a real trap" because it provides a lower entry point into the 3090 family but leaves users facing a $535,000 upgrade price and increased software prices if they want to move up a 3090 Model 150E. The 120E is a so-called "Group 30" machine for software pric-

Continued on page 108

The ups and downs of graduated pricing

IBM's new pricing scheme makes MVS/XA cheaper on small mainframes but more costly at the high end

CW CHART MITCHELL J. HAYES

More powerful 4381s, sub-$1 million 3090 ward off DEC, PCMs

BY ALAN ALPER and STANLEY GIBSON
CW STAFF

NEW YORK — IBM last week plugged the performance gap between its 4381 and 3090 processor families by unveiling four more powerful 4381 models and adding its smallest 3090 mainframe.

The mainframes are aimed at bolstering the mid-range of IBM's mainstay 370 architecture and deterring encroachment from Digital Equipment Corp., plug-compatible main-

frame rivals and vendors of used IBM equipment. To strengthen customer demand, IBM announced purchase incentives with the new processors.

Giving the 4381 line its second mid-life kicker in the last 15 months, IBM added Models 21, 22, 23 and 24, which are approximately 30% more powerful and can accommodate up to twice the memory of existing models, according to IBM.

The new offerings, taken together with the existing Models 11, 12, 13 and 14, offer a sixfold growth range and extend the life of the 4300 family, according to IBM.

The new entry-level 3090, called the Model 120E, is the first 3090 mainframe priced at less than $1 million. It offers between 70% and 80% of the performance of the next largest family member, the Model 150E, at 60% of the price.

The announcements create a performance overlap between the 4381 and 3090 product lines. The high-end 4381 Model 24 is 8% more powerful than the 3090 Model 120E, according to estimates based on IBM claims.

"This beefs up [IBM's] mid-range and puts them in better position against DEC," said Richard Mikita, an analyst with

Continued on page 109

HP fills slots in RISC framework

BY JEFFRY BEELER
CW STAFF

CUPERTINO, Calif. — Hewlett-Packard Co. extended its Precision Architecture down to the workstation level for the first time last week, introducing a desktop technical processor that the firm said provides roughly twice the price/performance of its chief rivals.

At the same time, HP made its strongest move yet to dispel lingering doubts about the viability of the Precision Architecture. The company reported wide-ranging advances on the commercial side of its Spectrum development project and said it will begin shipping its HP 3000 Model 930 superminicomputer within three months.

Aimed at the same market as workstations from Sun Microsystems, Inc. and Apollo Computer, Inc., the new HP Model 825SRX joins two other new additions to HP's Unix-based family of technical processors, one of which the firm described as its fastest supermini ever.

In a basic configuration, the high-end 9000 Model 850S offers 10% more throughput than the Digital Equipment Corp. VAX 8550 for half the price, according to Ed Hayes, general manager of HP's technical com-

Continued on page 8

Focus to give VAX users window on IBM data

BY CHARLES BABCOCK
CW STAFF

NEW YORK — Information Builders, Inc. is set to introduce a networking product that will allow a Focus user on a Digital Equipment Corp. VAX to query Focus on an IBM mainframe, according to company officials.

The mainframe version of Focus, with more than 2,200 installations, is a well-established means of accessing mainframe data bases. The new link, dubbed Focnet, is likely to become one immediate way of breaking down the data wall between the DEC and IBM data processing worlds. Focus, an information center-oriented fourth-generation language and data base management system, includes a natural-language interface that the firm said allows end users to form queries from English phrases, which can be executed on Focus in use at any processor node.

The unveiling is expected to take place next week at the annual meeting of the Focus users group — Fuse, Inc. — in Palm Desert, Calif. At introduction,

Continued on page 4

NEWSPAPER

CW00692OS-2 C
UNIVERSITY MICROFILMS INTL
SERIAL PUBLICATIONS
300 N ZEEB RD
ANN ARBOR MI 48106
**********5-DIGIT 48106

IN THIS ISSUE

The early bird . . . Altos develops and ships first 64-user 80386 computer to run Xenix System V, beating Prime and TI to market. Altos has shipped 100 of the systems, which use a 16-MHz version of the Intel chip, to VARs. Page 8.

NEWS

4 The Indy 500 zooms into high-tech.

4 IRS clears muddy waters of Section 1706

6 Managers won't help transfer pirated software to PS/2.

6 NCR, Intel will be no-shows at NCC.

6 Micro Channel lacks technological innovation.

9 Defense contractors want Pentagon regulations made compatible with MRP software.

10 NEC extends performance of color monitors

10 NEC rolls out Powermate 386 PC.

12 Dylakor enhances SQL/DS, DB2 interfaces.

13 Telecom seen gaining control of information.

13 MCI plans Disoss-telex link

13 PBX vendors steal ICA show spotlight.

14 Banyan Vines/386 exploits Intel chip.

14 80386-based systems featured at Comdex

15 Peripheral, connectivity, PS/2-related announcements may steal show.

18 Users banking on Ucvel financial software

18 MDBS develops Guru for VAX systems

19 IBM, Sears plan release of joint videotex service

19 Software Publishing upgrades desktop program.

108 Observers predict outcome of IBM announcements.

109 IBM adds Release 3.0 to DB2 family

110 IBM announcement moves system-managed storage plan forward

SOFTWARE & SERVICES

25 Texaco automates PL/I maintenance with expert system

25 CCA prepares to sell Model 204 as add-on strategic DBMS.

25 Firms slow to improve on "quick and dirty" system maintenance approach

Sick of winging it through job interviews? Page 73.

MICROCOMPUTING

37 Televideo pits engineering workstation against DEC, Apollo units.

37 Accelerator cards rev up desktop publishing.

37 Wang enhances existing micros.

37 Phoenix's Colvin says Micro Channel doesn't meet hype

NETWORKING

45 DEC, National Research back NBS in gateway development effort.

45 Users, vendors can't define keys of good network management system.

45 Getting the most from leased lines.

SYSTEMS & PERIPHERALS

57 Ryder pilots largest-ever System/36 project.

57 TRW gives Apollo DN590 Turbo high marks

Quotable

"I *love those meeces to pieces.*"

BILL GATES
MICROSOFT CORP

From a promotional poster for new Microsoft mouse

MANAGEMENT

75 Users don't take advantage of security safeguards.

75 DEC readies Xsel for customer use.

75 Section 1706 called revenue-neutral.

COMPUTER INDUSTRY

87 Dove aims to gain shareholders, continue 5GL technology at MCC.

87 Sytek's summer line features PC-oriented networking tools.

87 AMD seeks $1B, claims Intel violated technology agreement.

EMPLOYMENT TODAY

97 Employers seek candidate who fits job, not specifications.

SPOTLIGHT

PC compatible makers hope to profit from IBM's shift toward MIS-level sales.

Follows page 56.

IN DEPTH

67 Are your end-user computing returns high enough?

73 Would you want a job interviewer to make up his mind in four minutes?

OPINION & ANALYSIS

21 Withington believes in life after standards.

25 Pfirenzinger has good news and bad news about distributed computing

37 Zachmann reviews Infostructures' Popdrop.

45 Fleig cooks up an SAA strategy.

57 Connolly shoots at supercomputing snakes.

75 Pearkins recommends CBT classes.

87 Alper looks into Korean microcomputers.

DEPARTMENTS

20 Editorial

82 Calendar

104 Buy Sell Swap

IIA, ADAPSO plan mega-association

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Information Industry Association (IIA) and ADAPSO, the computer software and services industry association, took the first step last week toward a merger that would create a powerful but diverse coalition of nearly 1,400 vendors.

The executive committees of both trade groups recommended that their respective boards of directors "integrate some key activities for 1987 and 1988 to test the benefits of ultimate merger," according to a letter to the member companies, which was obtained by *Computerworld*.

"The merger of the two memberships would create the largest information-related association of its kind in the nation at a time when the information, computer service and software industries are emerging as the leading American industry," the committees wrote in the letter to the member companies.

A natural consequence

An industry source who is close to the merger negotiations said the talks are a natural consequence of the blurring of lines dividing the various segments of the information technology industry

ADAPSO represents such companies as Management Science America, Inc., Micropro International Corp., Electronic Data Systems Corp. and Automatic Data Processing, Inc.

The 25-year-old association, which now represents 900 firms, began as the Association of Data Processing Service Organizations to aid service bureaus. The association later expanded into software.

The IIA has operated for 18 years as a trade group for nearly 500 companies involved in the electronic generation and distribution of information.

The IIA represents firms such as Dow Jones & Co., The Dun & Bradstreet Corp., Mead Data Central, Inc., Telerate Systems, Inc. and Frnst & Sullivan, Inc.

Voting slated for June

The boards of the two associations are scheduled to meet separately in New York on June 22 to vote on a merger resolution to submit to their respective members in the fall. The delay is intended to allow all members ample opportunity to study the proposal.

To test the concept, the IIA and ADAPSO will first integrate their meetings and chapter activities to determine the potential benefits and problems of a merger, the committees wrote in the letter.

The negotiations were handled by a committee headed by Daniel M. Sullivan, chairman of IIA and president of Frost & Sullivan in New York, and Jay N. Goldberg, chairman of ADAPSO and chairman and chief executive officer of Money Management Systems, Inc. in New York.

BBN moving parallel

Joins Paine Webber in system development work

BY JAMES CONNOLLY
CW STAFF

CAMBRIDGE, Mass. — Bolt Beranek and Newman, Inc. (BBN) joined forces with Paine Webber Development Corp. last week in a $32 million parallel processing development effort.

The companies established a research and development limited partnership, which BBN subsidiary BBN Advanced Computers, Inc. will manage under the three-year agreement.

Paine Webber invested $32 million in exchange for royalty rights to products developed by the partnership.

To be based on Butterfly

The products developed by the partnership are expected to be high-performance parallel processing systems that are based on BBN's Butterfly architecture.

"Through this research and development effort, we hope to be able to provide a parallel processor with the look, feel and ease of use of a conventional system but with the power that matches or exceeds that of today's most powerful computers," explained Paul A. Castleman, president of BBN Advanced Computers.

Castleman said the systems to be developed are intended to increase productivity in the areas of complex-system simulation, image understanding and real-time monitoring and control in industrial, engineering and technical markets.

Castleman said the systems will include parallel programming development tools and will support industry-standard software.

THIS GIVES YOU A ROUGH IDEA OF HOW FAST SYNCSORT OS DOES ITS SORTING.

It's only a rough idea, granted.

But then, how do we convey the speed of SyncSort OS? A sort so fast it results in dramatic reductions in the use of your MVS or MVS XA computer resources? (Meaning CPU Time, EXCPs, disk work space and the like.)

Then, to compound matters, how do we tell you that we have features to make any programmer more productive?

And that our service is almost as fast as our sorts? (Over 85% of all problems are cleared up within 24 hours.)

There's really only one way for you to get an idea of how good SyncSort OS is. try it yourself. To arrange for a test on your system, call us at **201-930-9700.**

We'll whoosh right over.

syncsort

THE BEST OF SORTS.℠

© 1987 Syncsort Incorporated 50 Tice Boulevard Woodcliff Lake NJ 07

PCs given green light for Indy 500 race teams

BY JEAN S. BOZMAN
CW STAFF

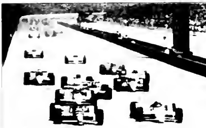
INDIANAPOLIS — As cars roared around the speedway here at speeds of more than 200 miles per hour during the 71st annual Indianapolis 500, their every move was monitored by personal computers.

A Compaq Computer Corp. Compaq 386 was set up to predict pit stops for last year's winner, Bobby Rahal; a trio of Hewlett-Packard Co. Vectras verified sponsor awards, and IBM Personal Computers kept the score and time.

Other computers were also on the scene but were somewhat less visible. A Perkin-Elmer Corp. Professional 7500 workstation verified oil and viscosities, while multiple microprocessors embedded in a car scale weighed the race cars and calculated weight distributions.

One of the newest applications of PC technology at the Indy 500 came in the area of product certification. About $1.15 million of the total $4 million in prize money came from special awards given to the winner and runners-up by vendors of oil, spark plugs and brake pads.

A team of 40 U.S. Auto Club officials monitored each of the 33 cars in the race, noting how product insignia were displayed on cars and uniforms. Before, during and after the race, the compliance data was set to be fed into data base applications built under the Guru expert system product from MDBS, Inc. in Lafayette, Ind. At the race's completion, all that remained to be done was enter the finishing order, and Guru would designate the sponsor prizes.



Computer-monitored *race cars head for Turn One at Indy.*

The compliance system, built in 1986 by MDBS employees who are racing enthusiasts, was also used in connection with last year's Indy 500. But the system only kept track of the product sponsors last year and did not compute the awards based on the use of products. At that time, Guru had not been installed for use at the Indianapolis race.

This year, three IBM PC-compatible HP Vectras, each with 640K bytes of memory and 40M bytes of hard-disk storage, kept track of 165 different awards. These awards ranged from a low of $100 for a 15th-place finisher to a high of $75,000, which went to Mario Andretti for gaining the pole position.

"We've got the data input and a complete set of award rules set up in the expert system," said Scott Blocher, an MDBS sales representive who helped program the Guru application. "The inference engine in Guru processes the rule and matches the award to the winner."

David Bowers, director of computer services for the U.S. Auto Club at the Indy 500, said the use of PCs greatly shortens the time needed to confirm product compliance — and lessens the number of errors in the data.

The end of the race would not mark the end of the verification process, however. "The U.S.

Indy champ Bobby Rahal

Auto Club tears the top 10 cars apart to test the oil and fuel level, the weight of the car and how high it rides off the ground," Bowers said. Any disqualification for technical reasons would require reallocation of the prizes according to the order in which the qualified cars finished.

From the way things have been going, personal computers should continue to play a vital role in the Indy 500. "There is a lot of data we would like to start keeping," Blocher said. "We intend to keep expanding our PC activities and to do more every year."

COMPUTERWORLD

Editor in Chief
Bill Laberis
Executive Editor
Paul Gillin
News Director
Peter Bartolik
Senior Editors
James Connolly, Systems
Clinton Wilder, Industry
Elisabeth Horwitt, Networking
Charles Babcock, Software
David Ludlum, Management
Douglas Barney, Microcomputing
Patricia Keefe, Networking
Ed Scannell, Microcomputing
Senior Writers
Donna Raimondi, Rosemary Hamilton
Stanley Gibson, David Bright
Ninamary Buba Maginnis
Staff Writer
Alan J. Ryan
New Products Editor
Suzanne Weixel

Features Director
George Harrar
Senior Editors
Janet Fiderio
Glenn Rifkin
Joanne Kelleher
Associate Editors
Amy Sommerfeld Fiore
Deborah Fickling, Penny Janzen
Assistant Editor
Kelly Shea
Senior Writer
Michael L. Sullivan-Trainor
Researcher
Sally Cusack

Managing Editor
Donovan White
Chief Copy Editor
Patricia Heal Erickson
Assistant Chief Copy Editor
Steven M. Ulfelder
Copy Editors
David W. Bromley, Mary Grover
Martha E. Ruch, Sharon Baker
Laura O'Connell, Marie T. Burke
James Daly

Design Editor
Maryjee Magowan
Graphics Editor
Mitchell J. Hayes
Graphic Designer
P. Charles Ladouceur

Assistant to the Editor in Chief
Parth Domke
Editorial Assistants
Patricia Faherty, Christie Sears
Linda Gorgone, Bonnie MacKeil
Rights and Permissions Manager
Nancy Shannon

News Bureaus
Mid-Atlantic
201/967-1350
Alan Alper, Correspondent
Washington, D.C.
202/347-6718
Mitch Betts, Correspondent
West Coast
415/328-8064
Jeffry Beeler, Chief
James A. Martin, Correspondent
Midwest
312/827-4433
Jean S. Bozman, Correspondent

IDG News Service
Susan Blakeney, Director

Main Editorial Office
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171
617/879-0700

Computerworld is a publication of IDG Communications, the world's largest publisher of computer-related information. IDG Communications publishes over 80 computer publications in more than 28 major countries. Fourteen million people read one or more IDG Communications publications each month. IDG Communications publications contribute to the IDG News Service offering the latest on domestic and international computer news. IDG Communications publications include: ARGENTINA'S Computerworld Argentina, PC Mundo; ASIA'S Communications World, Computerworld Hong Kong, Computerworld Indonesia, Computerworld Malaysia, Computerworld Singapore, Computerworld Southeast Asia, PC Review; AUSTRALIA'S Computerworld Australia, Communications World, Australian PC World, Australian Macworld; AUSTRIA'S Computerwelt Oesterreich; BRAZIL'S DataNews, PC Mundo, Micro Mundo; CHILE'S Informatica, Computacion Personal; DENMARK'S Computerworld Danmark, PC World Danmark; FINLAND'S Mikro, Tietoviikko; FRANCE'S Le Monde Informatique, Distributique, InfoPC, Le Monde Des Telecoms; GREECE'S Micro and Computer Age; HUNGARY'S Computerworld SZT, Mikrovilag; INDIA'S Dataquest; ISRAEL'S People & Computers Weekly, People & Computers Biweekly; ITALY'S Computerworld Italia; JAPAN'S Computerworld Japan; MEXICO'S Computerworld Mexico; THE NETHERLANDS' Computerworld Netherlands, PC World Benelux; NEW ZEALAND'S Computerworld New Zealand; NORWAY'S Computerworld Norge, PC World Norge; PEOPLE'S REPUBLIC OF CHINA'S China Computerworld, China Computerworld Monthly; SAUDI ARABIA'S Arabian Computer News; SOUTH KOREA'S Computerworld Korea, PC World Korea; SPAIN'S Computerworld Espana, Commodore World, PC World Espana, Communicaciones World, Informatica Industria; SWEDEN'S ComputerSweden, Mikrodatorn, Svenska PC World; SWITZERLAND'S Computerworld Schweiz; UNITED KINGDOM'S Computer News, DEC Today, ICL Today, PC Business World; UNITED STATES' Amiga World, Boston Computer News, CD-ROM Review, Computerworld, Computers in Science, Digital News, Federal Computer Week, 80 Micro, FIDUCS Publications, InCider, Infoworld, Macworld, Computer + Software News (Micro Marketworld/Lebhar-Friedman), Network World, PC World, Portable Computer Review, Publish!, PC Resource, Run; VENEZUELA'S Computerworld Venezuela; WEST GERMANY'S Computerwoche, PC Welt, Run, [illegible] Markt, PC Woche.

Focus

FROM PAGE 1

Focnet will be for read and instruction executing purposes only, with a release later this year intended to allow data base updates as well.

Gerald Cohen, chairman of Information Builders, said the link, called Focnet, has been built with off-the-shelf components using the LU2.2 communications protocol and DEC's IBM Systems Network Architecture gateway.

Cohen said the link would allow a Focus user on the VAX to formulate a query and transmit it over the link to Focus on the mainframe where it would be directed against the proper mainframe data base.

Focus is capable of accessing "any mainframe data structure," including IBM's IMS, VSAM and DB2 files, as well as the data base management systems of third-party vendors, such as Datacom/DB from Applied Data Research, Inc., IDMS/R from Cullinet Software, Inc. and Adabas from Software AG of North America. Focus can execute a relational join against the files from any two or more of these sources and send the results back to the DEC user.

Limits as to how much on-line processing should be done on the mainframe in response to a query can be incorporated into the user profile implemented on the mainframe side. For example, Cohen said, a query that was determined to require lengthy processing could be directed to run in a background or batch mode.

Although Focus on the VAX and mainframe look the same to the user, they are different products written to take advantage of each vendor's hardware. As a result, the VAX Focus user does not leave the VMS environment and work with the mainframe Focus once Focnet has established the link. Rather, data retrieval requests are passed from one site to the other and the response returned, Cohen said.

The initial product, set to be available in July or August at prices that range from $3,500 on the VAX side to $16,000 on the mainframe side, will allow queries only. A release to be issued later this year will allow updates to mainframe data bases from the VAX, Cohen said.

Focus is an information center-oriented fourth-generation language and data base management system installed on 2,200 mainframes and 400 VAXs, Information Builders spokesmen said. "A significant number of our DEC users are also IBM users," Cohen noted.

IRS clarifies 1706 law

Agency extends grace period for tax payments

BY DAVID A. LUDLUM
CW STAFF

WASHINGTON, D.C. — The Internal Revenue Service last week issued further guidelines aimed at clarifying Section 1706 of last year's Tax Reform Act and extended and broadened its grace period for late filing of some taxes due from employers as a result of Section 1706.

Considerable confusion has surrounded Section 1706 since its existence became widely known in November 1986. Part of the tax overhaul approved by Congress earlier in the year, it limits the ability of certain engineering and computer professionals to be treated for tax purposes as independent contractors, requiring many of them to be treated as employees of an organization for which they provide services or of a broker that places them in jobs.

The new IRS ruling makes use of 20 common law standards and three case studies to clarify when such technical service workers should be treated as employees of the broker. It emphasizes that the standards must be applied subjectively to individual cases to accurately assess a relationship.

The same standards might apply to questions about the relationship between a technical service worker and the organization for which he provides services, but the IRS is prohibited from issuing public statements on those relationships, IRS spokesman Wilson Fadely said.

The 20 standards chiefly concern an organization's right to control *how* an individual's work is done, regardless of whether or not the organization exercises that control. Such factors include whether the individual works for others and the length of the relationship.

The IRS also extended and broadened waivers on penalties applying to employers that fail to pay taxes or file tax forms required by Section 1706. The waiver now applies to late payment of Social Security taxes for the first and second quarters if they are paid by July 31, late payment of unemployment taxes for the first quarter if they are paid by July 31 and late filing of Form 941, Employer's Quarterly Federal Tax Return, for the first quarter if it is filed by July 31.

Why does one DBMS win so many benchmarks? Find out.

When Computer Corporation of America's MODEL 204 goes up against the competition, we win. Consistently. And the results are impressing a lot of information system managers.

Because in benchmark after benchmark, CCA has been setting a new standard of performance.

If your organization is currently evaluating DBMS software, you should be talking to us. Because seeing is believing.

Find out why more information system managers are including us in their DBMS evaluations. They've got good reasons. Reasons like high performance. Responsiveness to change. Capacity. Efficiency. Vendor reliability and support.

At CCA we don't promise anything we can't deliver. And right now, MODEL 204 is simply the best designed production-oriented, 4th generation, relational-based DBMS around.

Isn't it time to take a look at why all those other information systems managers are including CCA in their DBMS evaluation benchmarks?

We're ready to demonstrate the reasons why. Send in the coupon below, today.

I'm interested in evaluating MODEL 204.
Mail to: Four Cambridge Center, Cambridge, MA 02142

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____

Computer _____

Computer Corporation of America

A Crowntek Company

NCR, Intel cancel plans to exhibit wares at NCC

BY ALAN J. RYAN
CW STAFF

The National Computer Conference, plagued by faltering preregistrations and a major reduction in exhibitors, was dealt another blow last week when NCR Corp. and Intel Corp. confirmed they will not display their wares at the show.

Dan Gerst, program manager for exhibit management at NCR, said the computer and business equipment manufacturer made its decision to drop out of NCC '87 after careful contemplation. Less than 150 exhibitors have purchased booth space for this year's show, which is set to run from June 15-18 at Chicago's McCormick Place. In previous years, NCC drew more than 700 exhibitors.

By not exhibiting at NCC, Gerst estimated NCR will save $30,000 to $35,000 in direct costs, including booth rental, travel charges and installation and dismantling costs.

Meanwhile, a spokeswoman for Intel said the semiconductor giant has reserved and paid for a 10- by 10-foot booth space for the show but has no plans to use it. She said Intel's booth was booked solely so the company would maintain its priority standing in case it choose to exhibit at NCC in future years.

A spokeswoman for the American Federation of Information Processing Societies (AFIPS) said late last week that she was unaware that NCR and Intel would not be exhibiting. The spokeswoman added that exhibitors who decide to pull out of the show are required to inform NCC of the decision.

Sharing the fair

In other developments, a spokesman for the show said late last week that NCC was about to sign documents to share NCC '87 conference space with Softfair, a job fair for software professionals sponsored by the Goldman Group, Inc. in Westford, Mass. "Softfair will be sharing the space and promotional costs," said Roger Halligan, promotion chairman for NCC. He added that some exhibitors will have booths in both Softfair and NCC.

Paul Vincent, president of the Goldman Group, said that Softfair and NCC will be "concurrent events, but not necessarily affiliated." He said that while there is no confirmed number of exhibitors for Softfair, "we would expect at least 40 exhibitors, but we won't know until we get right down to the wire."

Discussions on jointly running the Softfair and NCC shows began about three months ago, Vincent said. As of last week, NCC's Halligan said the group was very close to signing with a professional management team to run future NCC exhibitions.

The once-sprawling NCC, sponsored by AFIPS and four other groups, will be held in one hall at McCormick Place this year, although the entire exhibition center has been reserved for the show.

While the future of the show remains uncertain in the minds of vendors and users, some exhibitors who are committed to booth space have expressed optimism. A Fujitsu America Ltd. spokeswoman said her company's 60- by 60-foot booth will likely draw many visitors because some potential big-draw companies will not exhibit at NCC.

Scott Humphrey, a spokesman for Britton Lee, Inc. in Los Gatos, Calif., said his company plans to introduce a new product line at the show, and, he said, "because some of the big players have dropped out, it allows some of us not-quite-as-large companies to get a little more exposure."

Some larger vendors planning to exhibit at the show include AT&T, Honeywell Bull, Inc., Northern Telecom, Inc., Xerox Corp. and IBM. An IBM official would neither confirm nor deny that the company plans to make a new product introduction at the show. "It's our understanding that IBM is planning to make a new product announcement," NCC's Halligan said. He added that IBM has requested a separate room off the exhibit floor where it will likely have the product on display.

PS/2's pirate trap

Switch to smaller disk offers copying stopgap

BY DOUGLAS BARNEY
CW STAFF

The migration to IBM's Personal System/2 microcomputer line with 3½-in. floppy disks provides an ideal opportunity for MIS directors and micro managers to help eliminate pirated software, users said last week. However, it also may present the potential for further piracy as users make copies of already-pirated software to run on the new machines.

The issue of software piracy has died down during the past year, as most vendors removed copy protection and corporations implemented stringent policies against illegal copying. Nevertheless, most observers acknowledge that a large number of pirated programs are still in use, even in corporations that strictly police copying.

In helping end users convert software to the PS/2, managers may confront the issue of what to do about pirated software found in users' private software libraries. MIS or micro managers contacted by *Computerworld* said they will not assist end users in transferring pirated software to the new machines. Instead, the managers said, the transition to the PS/2 will be used to weed out the pirated software they expect to find. "Pirated software will just not be transported to the new system," said Fred M. Zickert, manager of personal computers for Eaton Corp. in Cleveland.

Alienating the user

This weeding out, however, promises to be a difficult process that may result in a host of unhappy end users. "You may end up alienating the end user," said a PC coordinator who asked not to be identified. And some managers themselves may be unwilling to police users. "You are asking people in the end-user computing departments to play God," a manager said.

One manager suggested that end users be appeased so they will not turn away from MIS or micro managers and "go it alone." He said illegally copied software that is useful to the user should be purchased legitimately by the company. Software that is not useful, however, should be thrown out.

But eliminating pirated software is not as easy as it sounds. In many cases, the discovery of pirated software is dependent on the user's neglecting to conceal the software from computer managers. "This process [of moving to a new format] will not detect pirated software" that users deliberately conceal from MIS, said Joseph T. Brophy, senior vice-president of data processing at The Travelers Corp.

Pirates will be pirates

The conversion itself could create occasions to pirate as users copy older software to 3½-in. disks and are tempted to give the original disk away, according to Brophy.

The extent to which pirated software is weeded out will also depend largely on the structure of the corporate computing environment. Centralized computing environments often have a good handle on the problem already, users said. But even centrally controlled organizations may be unable to eliminate all pirated software. If the software library is on a user's hard disk, an MIS professional may unwittingly transfer pirated software, one manager admitted. To avoid this, managers must go through the painstaking process of unearthing the original documentation of the software to verify its authenticity.

An alternative that managers are unwilling to discuss is to provide workers with mechanisms to move software libraries to the new diskettes and, essentially, ignore the possibility that they might transfer illegal, copied software. Nevertheless, this approach is expected to be taken in many decentralized organizations, users said.

Aaron Golberg, a microcomputer analyst and vice-president at International Data Corp. in Framingham, Mass., said he believes this approach will be common, because many workers have become dependent upon their pirated software. "Managers may have no choice if they don't want to impede worker productivity," Goldberg said.

Users say PS/2 bus lacks sparkle

BY ED SCANNELL
CW STAFF

While the technology used in IBM's Micro Channel architecture provides microcomputer users with some much-needed performance advantages, most observers agree there is little that is genuinely innovative in the IBM Personal System/2 bus.

Observers point out that the Micro Channel's multimaster bus, contention protocol, self-configuration abilities and use of burst-mode direct-memory access technology is a step forward in the context of microcomputers but that it is certainly not unique.

"Multimastering and self-configuration have existed on minicomputers and some mainframes for years. It's nice that IBM has finally put them on their microcomputers, but it's not something I would jump up and down about," says Neil Colvin, chief executive officer and chief scientist at Phoenix Technologies Ltd.

"There are some new ideas in [the Micro Channel], like the arbitration among the different boards in the bus and the contention protocol, but only in the context of the PC," says Dado Banatao, vice-president and general manager of Chips and Technologies, Inc.'s systems logic group.

This lack of sparkling technological innovation is, perhaps, one reason why so many prominent third-party manufacturers have not rushed to clone the system. Leading compatible makers such as Compaq Computer Corp. and Tandy Corp. have recently said all the Micro Channel's technological advances could have been accomplished within the existing standard.

Channel semantics

IBM's use of the word "channel" has led some to believe the Micro Channel is modeled after the multiplex channels used in IBM's large systems. Experts note, however, that the channel bears little resemblance to those used in IBM's larger systems, which connect processors with various peripherals.

IBM admits there is little technological relationship between the Micro Channel and its multiplex channels. The use of the word "channel" to describe the architecture is appropriate, however, according to Les McDermott, who supervised the Micro Channel project at IBM.

McDermott says a channel, by IBM's definition, is a mechanism used to transfer information to and from memory and I/O devices, which is exactly what the Micro Channel does. IBM considered the possibility of combining the Micro Channel's bus with that of its Personal Computer, according to the company, but there were several technological reasons why that would not be an effective implementation, such as serious degradations in performance.

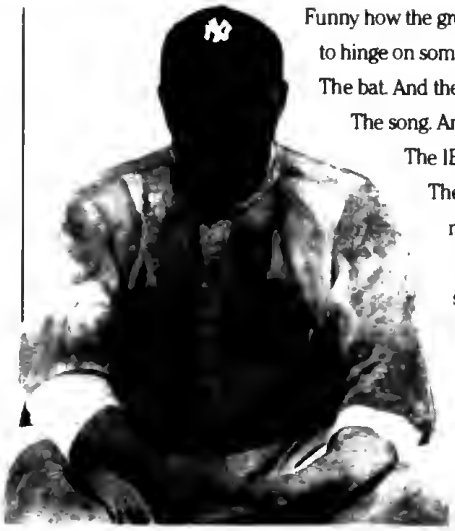
Third-party involvement

Many observers disagree, saying that in the next year or so there will be an extended period in which manufacturers will offer some combination of the Micro Channel with the existing bus.

IBM says it is has no plans to license the Micro Channel's design to third parties, although it says it will continue to license "utility patents" on a nondiscriminatory basis under reasonable terms and conditions.

Some observers expect IBM to eventually license the Micro Channel to third parties because it has published some of the channel's specifications and because IBM will need assistance if it is to establish the Micro Channel as a standard.

While there have been unconfirmed rumors that IBM has approached third parties about licensing the Micro Channel, many are surprised that IBM has not openly courted such vendors. Some suspect IBM has not because it does not own all the technology in the architecture.



Funny how the greatest success stories always seem to hinge on some special combination.
The bat. And the hitter.
The song. And the singer.
The IBM 9370. And VMCENTER II.
The 9370's potential for greatness has never been in doubt. But it takes more than potential to make departmental systems run smoothly throughout large organizations.
What it takes—is VMCENTER II.

THE ACCESS USERS NEED. THE CONTROL YOU NEED.

VM CENTER II AND THE 9370: A HARD-HITTING COMBINATION.

VMCENTER II is VM Software's newest, most comprehensive answer to the systems management needs of the VM operating environment—the environment best suited to the overwhelming majority of 9370 users.

In one easy-to-use package, VMCENTER II brings computing power to the people who need it at every organizational level. Equally important, VMCENTER II helps maintain strong central control while vastly reducing the tasks traditionally faced by data processing professionals in interactive user environments.

System security. DASD management. Performance monitoring. Project accounting. They may sound mundane. But they're critical to smooth-running applications. And VMCENTER II takes care of them all—plus a lot more.

All this while users are enjoying dependable, easy access to a system that performs at its peak, day after day. And even helps them plan ahead for future needs.

THE POWER. AND THE GLORY.

The 9370 marks a great opportunity for your entire organization. But to make the most of it, there's nothing like VMCENTER II. After all, VMCENTER II is based on the original VMCENTER—the world's leading VM data center management system. And it's loaded with new features specifically designed for departmental environments.

The result is a system that's a potent partner for the 9370. A sure way to simplify a major transition for your organization. And an all-round clutch performer that'll make *you* look good for choosing it.

VMCENTER II. For more information call **1-800-562-7100** (In Virginia or outside the Continental U.S. 703-264-8000). Or write VM Software, Inc., 1800 Alexander Bell Drive, Reston, Virginia 22091.

Babe Ruth's bat courtesy of The Major League Baseball Players Alumni Association
© 1987 VM Software Inc.

1 CWX 870525

VM SOFTWARE INC.

VMCENTER II FROM VM SOFTWARE, INC.

Altos 386-based CPU handles Xenix System V

BY DAVID BRIGHT
CW STAFF

SAN JOSE, Calif. — Altos Computer Systems tomorrow will reportedly announce a 64-user Intel Corp. 80386-based computer that it claims is the first 80386-based multiuser system to run Microsoft Corp.'s Xenix System V operating system.

The company said it has already shipped nearly 100 production systems, mainly to value-added resellers.

Because the new Series 2000 system uses the same chassis as Altos's 80286-based line, it is compatible with software developed for that line and benefits from the proven technology of those systems, said Jeff Bork, vice-president of product marketing and planning. The chassis uses a 32-bit bus and houses the company's Motorola, Inc. 68020-based OEM systems, Bork added.

"We're not bringing to market a product that's going to require six or eight months of shakeout," Bork said. "We want to stress the fact that it is shipping, that we weren't just trying to get an announcement out in time for Comdex/Spring '87. We now have orders for between 350 and 400 units, which will be our total production through the end of June."

Bork said software for the 80286-based systems can be recompiled to take advantage of the 80386 chip's extra capabilities. Rather than wait for Microsoft to finish developing Xenix System V, Altos did its own development to Microsoft's specifications, Bork said.

Altos is apparently the first well-known vendor to actually begin shipments of an 80386 multiuser system. Prime Computer, Inc. and Texas Instruments, Inc. both recently introduced competing systems but expect to start shipments in June and the fourth quarter, respectively.

While the Prime system has the ability of running Microsoft's MS-DOS as a task under Unix, the Altos system will not have that feature until late this year, Bork said.

Faster chip in future

The Altos and Prime systems use 16-MHz versions of the 80386, while the TI system is built around the 20-MHz version. Bork said that Altos will probably move to the faster chip in the future, when Intel is able to produce it in greater volume.

Prices for the Series 2000 start around $25,000 to $30,000 for configurations with an 80387 math coprocessor, at least 4M bytes of random-access memory (RAM), a small computer systems interface intelligent file processor subsystem, a communications processor, a 1.6M-byte floppy disk drive, a tape backup drive and one terminal.

The system can be expanded to up to 16M bytes of RAM and up to 1.2G bytes of hard-disk storage, Altos said.

Honored in New York last week *for "Achievement in Managing Information Technology" were, from left, Michael R. Zucchini, president of General Re Services Corp.; C. Clinton Joyce, senior vice-president of MIS for Albertson's, Inc.; Michael P. Cruskie, executive deputy commissioner of the state of New York Division of Criminal Justice Services; Joseph T. Brophy, senior vice-president of data processing at The Travelers Corp., and, not pictured, Ron J. Ponder, senior vice-president of Information Systems Division at Federal Express Corp. The five were honored for outstanding contributions to their organizations through effective use of computer systems and communications technology. More than 350 nominations were received for the first annual awards, cosponsored by American Management Systems, Inc. and Carnegie-Mellon University's Graduate School of Industrial Administration.*

HP fills slot

FROM PAGE 1

puter operation.

The entry-level 9000 Model 825S outperforms DEC's Microvax II threefold and costs about the same, Hayes said.

The 825SRX, rated at 8.2 million instructions per second, couples the desktop 825S with a three-dimensional interactive graphics subsystem. Considered HP's fastest workstation, the machine is optimized for sophisticated mechanical engineering applications, according to Jim Haselmaier, product marketing manager for HP's Systems Software Operation.

The 825X and 850S, in contrast, bracket HP's existing 9000 Series 840S technical processor, which the company last week enhanced with the addition of an optional I/O extender cabinet. As a result of the enhancement, the 840S's main memory capacity has been quadrupled to 96M bytes.

The number of users it can support concurrently has tripled to 50, Hayes said.

A minimum 825S configuration, which starts at 8M bytes of main memory and holds up to 56M bytes, costs $42,500, compared with $200,000 for a basic 850S, which expands from 16M to 128M bytes of internal storage. In contrast, an 8M-byte base configuration of the 825SRX costs $86,500.

On the technical minicomputer side of its product line, the twin introductions of the 825S and 850S mark a sharp departure in HP's pricing strategy.

Last week's announcement also included HP's most specific and upbeat statement to date about its timetable for delivering the 3000 Model 930 and its progress in remedying the system's much-publicized ills.

HP recently said it will begin releasing the 930 in limited quantities in August. Prior to last week's update, the company had only said shipments would begin sometime between May and August.

Shipping in fourth quarter

HP also reaffirmed its previously announced intention to start shipping the 930's larger companion system, the 3000 Model 950, during the fourth quarter.

As part of last week's announcement, HP doubled the 930 and 950's maximum internal storage to 96M and 128M bytes, respectively, by upgrading their circuit technology to 1M-bit random-access memory chips. In addition, the firm has trimmed the former system's starting price from $225,000 to $180,000 — a response to IBM's 9370 announcement — and fixed the latter's previously undisclosed price at $260,000, according to Sharon Jacobs, marketing manager with HP's Commercial Systems Business Unit.

HP also added three storage products to its existing 3000 series processors, which use a conventional non-Spectrum design. Included among the peripherals are the Model 7980 tape drive and the Model 7937XP cached-disk module, the latter of which reportedly boosts the performance of the HP 3000 Model 70 by 20%. The third addition, known as Turbo Store, is software that allows disk-stored data to be backed up to as many as four tape subsystems simultaneously.

HP also furnished previously undisclosed details about the results of its ongoing efforts to resolve the software problems that necessitated a delay in the 930's shipments.

Announced alongside the 950 in February 1986, the 930 was originally set to be delivered by the end of last year. But in September 1986, HP reported some serious defects that forced it to postpone the processor's availability until "mid-1987." What prompted the sudden shift in plans were unforeseen inefficiencies in the 930's software rather than basic flaws in Precision Architecture itself, which uses a reduced instruction set as one of its main design elements, according to HP. In essence, the programs were found to contain far too many lines of code.

Since then, however, HP has edited or otherwise streamlined the software to reduce the amount of code needed to perform a given task. In so doing, the firm has increased from 60% to 73% the speed with which the 930 can read and open files or do other common I/O-oriented jobs, Jacobs said.

The 7980 tape subsystem costs $22,400, and Turbo Store ranges in price from $2,100 to $7,000, depending on the processor model. Prices for the 7937XP were unavailable at press time.

each with a parallel port for connecting to IBM PCs.

- Small 14 x 14 footprint fits tight spaces
- Forms-saving demand-document tear bar
- Fully integrated — no box!
- 150 cps with up to 132 characters/line
- Rugged enough for factory floors
- Priced as low as $2 565

For more information call 1-800-544-4072 (in Michigan 313/769-5900). Or write

Interface Systems, Inc.

Problem-Solving Printers for IBM Systems

5855 Interface Drive, Ann Arbor, MI 48103. Telex 810 223 6058

Contractors protest Defense MRP stance

Say cost-accounting regulations should be changed to take advantage of packaged software

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Defense contractors, responding to Department of Defense charges that their material requirements planning (MRP) systems may be overcharging the government, argued last week that military contracting regulations should be made compatible with MRP software.

At a congressional hearing, the Aerospace Industries Association (AIA) said there may be isolated cases of deliberate fraud, but the major problem is that MRP software first developed in the commercial world is basically incompatible with Defense Department cost-accounting regulations.

Therefore, the outdated regulations should be revised so that the industry and government will not lose the cost and efficiency benefits of MRP software, testified Don Fuqua, president of AIA.

He recommended formation of a joint industry/Defense Department task force to resolve the regulatory and software problems.

Suspects overcharging

The Pentagon has launched a sweeping investigation of MRP systems at 300 defense industry plants because it suspects that the software allows contractors to overcharge the government by shifting costs from one contract to another and inflating prices, in violation of procurement rules [CW, May 11].

An MRP system uses complex accounting software to regulate the flow of parts, inventories and costs at manufacturing facilities.

The system is used to prevent excess inventories and handle surges in production demand, for example.

Pentagon auditors want each part of the system and its actual cost pegged to a single defense contract to provide physical traceability, but many MRP systems reallocate parts to various commercial and defense projects to meet efficiency objectives on a daily basis.

Audit trail difficult

The Defense Contract Audit Agency (DCAA) is concerned that this constant reallocation makes it virtually impossible to generate an audit trail.

Furthermore, the auditors are concerned that when parts are transferred in inventory, they are given "moving average" prices that may be higher than actual costs.

According to the AIA, a policy of reserving parts for use on specific defense contracts "renders an MRP system virtually useless," because it prevents the software from juggling resources in the most cost-effective manner to keep the assembly line moving.

Furthermore, cost-averaging is an accepted accounting technique that "averages out in the end," AIA's Fuqua said.

The testimony was part of a series of hearings held by the House Armed Services Committee's Subcommittee on Readiness, chaired by Rep. Dan Daniel (D-Va.).

Williston B. Cofer Jr., a subcommittee staff member who summarized the MRP issue at the close of the hearing, said the contractors have taken software that was successful in the commercial sector and applied it to the government sector, but it cannot meet government regulatory constraints.

Change software, not rules

Rather than change the regulations, Cofer said, it is more logical for contractors to change their software to comply with government standards.

He noted that there are new MRP products that do meet Defense Department rules.

For example, Western Data Systems, an MRP software vendor based in Woodland Hills, Calif., claims that its product was specifically designed to comply with Defense Department rules for contract-by-contract accounting.

Other vendors of dedicated government MRP packages include Arthur Andersen & Co., McCormack & Dodge Corp., Management Science America, Inc. and Cullinet Software, Inc., according to International Data Corp., a Framingham, Mass.-based research organization.

"The AIA is taking the position that some of the regulations run counter to maximum efficiency in certain plant operations. But that doesn't really invalidate DCAA's concerns. DCAA is only concerned with the rules and regulations that are on the books," commented Rudy Konig, vice-president of government programs in the McLean, Va., office of Western Data Systems.

"You can't automatically take software designed for use in a purely commercial environment and just implement it in a defense environment. That just won't work, because in defense work each contract is a document unto itself, and you have to follow its requirements without reference to any other contract that you may be working on," Konig said in an interview.

If you had read our COBOL books in 1977, you wouldn't have the maintenance problems... or the backlog...that you have today

In 1977, most COBOL programming was unstructured. But during the next few years, most companies selected a structured development method. Back then, IBM was promoting its HIPO methodology, but more than a dozen other people and companies were promoting their own charts, diagrams, or what-nots for structured programming.

Today, right or wrong, most companies are sticking with the methods they selected in the 70's. The trouble is that most of those methods didn't produce the benefits they promised. As a result, program maintenance in most shops is a worse problem today than it was 10 years ago. And most companies have made only trivial improvements in productivity in the last 10 years, so their backlogs are larger than ever.

Back in 1977, we published a book on structured programming that could have made a difference in your COBOL shop. This book presented a practical method of program development. The method was easy to learn, easy to implement, gave you more reliable programs in less time, and made programmers say, "This is so easy. Why doesn't everyone do it this way?" Now, you can find out how to benefit from this method yourself in a book called *How to Design and Develop COBOL Programs*.

The 2 keys to this program-development method

1. The method in this book is based on a simple design theory that says: Design a program from the top down using a structure chart *until each module can be coded in a single COBOL paragraph without using inline PERFORM statements*. When you do this, the structure chart is an index to the COBOL code, and each module is short and manageable. That makes the program easier to code, test, and maintain.

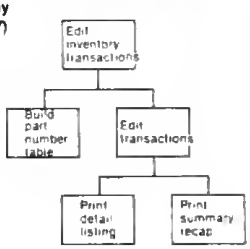
2. The design and coding techniques of this method make it easy for you to reuse code from old programs. That's why most shops can improve productivity by 250% or more when they use this method. *In fact, if 50% or more of each new program in your shop doesn't consist of code from old programs, you're not getting your money's worth from your current development method.*

How you can use our book to improve program development in your shop

How to Design and Develop COBOL Programs teaches practical techniques that support the design theory I've just described. Most important, you'll learn how to design a program, plan its modules, and code and test it from the top down. These are the critical techniques you need for developing both batch and interactive programs. Once you master these techniques, you'll be able to develop programs that are easy to maintain. And you'll develop them more efficiently than you've ever done before.

To improve program development in your shop, all you have to do is buy one copy of the book for each programmer. Because the book is interesting, your programmers will read it. Because the book is convincing, your programmers will try the method that they learn. Because the method works, program development will improve in your shop. In most shops, the method will be acceptable under your current programming standards so you won't even have to have it approved by committee.

A structure chart for an edit program that will lead to an unmaintainable mess (find out why in chapter 7)



The COBOL Programmer's Handbook

To make this programming method easy to implement, we developed *The COBOL Programmer's Handbook* to go along with the text. It presents complete standards for program development. It also presents seven complete programs (four batch and three interactive)—that you can use as models for new programs. By reusing the design and code in these programs, you'll quickly boost both productivity and program quality in your shop.

Unlimited guarantee

So there's no risk to you, our books come with my unconditional guarantee: If they don't help you develop programs that are easy to maintain in less time than it ever took before, you can return them for a full refund—no questions asked, *no time limit*.

But don't wait until 1997 to review these books. Order them now so you can be sure that you won't have the problems in 1997 that you have today.

Mike Murach & Associates, Inc.
4697 West Jacquelyn Avenue
Fresno, California 93722
(209) 275-3335

Mike Murach & Associates, Inc., 4697 W. Jacquelyn, Fresno, CA 93722

Dear Mike: Please send me the books I've indicated below. If they don't help me develop programs that are easy to maintain in less time than it ever took before, I'll send them back for a full refund—no matter how long I've had them. I understand I will be billed for the books plus UPS shipping and handling (plus sales tax in California).

___ **How to Design and Develop COBOL Programs** 528 pages, $20

___ **The COBOL Programmer's Handbook** 319 pages, $20

Bill my company for the books. P.O. number _____

Bill me for the books

Charge the books to my ___ Visa ___ Mastercard

Card no _____ Exp. date ____

Signature _____

Name and title _____

Company (if billed) _____

Address _____

City, state, zip _____ CP2

NEC lengthens Multisynch monitor line

BY ALAN ALPER
CW STAFF

NEW YORK — NEC Home Electronics U.S.A., Inc. last week unveiled two high-end Multisynch color monitors targeted at sophisticated personal computer business and engineering graphics applications.

The monitors feature the same scanning ability as the original Multisynch display, which enables the unit to automatically adapt its vertical and horizontal frequency to the graphics adapter residing in the microcomputer. The feature facilitates compatibility with a wide range of graphics boards, including IBM's Enhanced Graphics Adapter (EGA) and Color Graphics Adapter (CGA), that are used in micros such as IBM Personal Computers, PC XTs and compatibles, Personal System/2s and Apple Computer, Inc. open-architecture Macintosh IIs.

The original Multisynch monitor, unveiled in November 1985, has captured a large portion of the color-monitor market and spawned a host of look-alikes. NEC said it is currently shipping about 50,000 units per month.

The Multisynch Plus is aimed primarily at business presentation graphics applications, according to Keith Schaefer, senior vice-president and general manager of NEC's computer products division. The monitor operates at 55 MHz and features a 15-in. diagonal screen with a resolution of 960 by 720 pixels. It carries a list price of $1,399.

A monitor for design

The Multisynch XL is intended for use in computer-aided engineering, design and manufacturing applications as well as desktop publishing, Schaefer said. It features a 20-in. diagonal display with a screen resolution of 1,024 by 768 pixels and operates at 65 MHz. The monitor can display up to 64 colors when using an EGA card and unlimited colors in Video Graphics Array, Multiple CGA and Professional Graphics Adapter analog modes. It lists for $3,195.

Both monitors come with a three-way text switch, allowing them to be used in a monochrome mode: paper-white for desktop publishing, green for monochrome graphics and amber for word processing or spreadsheet work.

The monitors feature flattened square-corner screens that are said to increase the viewing area and reduce glare, and full tilt-and-swivel capabilities. The two monitors are scheduled to be available this summer through NEC's reseller channel, according to the Wood Dale, Ill., firm.

Such robust sales have placed NEC in the enviable situation of not having to increase prices, despite yen appreciation of almost 70% since the monitor was introduced.

David on Goliath

Dave Lester. He rides a quarterhorse, skis off cliffs and knows everything there is to know about printers.* Here, he tells why you should buy your next line, band or laserprinter from him, rather than from one of the big, Goliath-size printer companies.

I was just a kid.

My first job was with Qume. I was 20 years old and in college. Being young and idealistic, I just wanted to do a good job. Almost immediately, I found myself running a production line and had 20 employees.

About the worst-designed ribbon lift mechanism the world has yet seen.

I learned everything there was to know about printers. Piece by piece. There was no problem I couldn't immediately diagnose and fix. The Sprint 5 may have had the worst-designed ribbon lift mechanism the world has yet seen, but it could be made to work, and work perfectly.

Pretty soon I was also doing customer support.

When distributor relations got really tough, *yours-truly-the-printer-whiz* was sent into the field. Like the time a customer claimed printer DOAs were in excess of 50%. In half a day, making trivial adjustments and tweaks on 50 printers, we had a happy distributor. And I had a great job offer.

The secretary and the DIP switches.

My new job was selling for a big printer distributor. One day I was talking to a woman who said one of the printers she got from us was the biggest piece of junk in the world; and that we should never darken her doorstep again. I asked her to be specific with her problem description. And since she was sitting beside the unit as we talked, I asked her to open it up and reset some of the DIP switches and then try the printer. It worked better than it ever had before. She was elated, and they bought five more printers.

© 1986

Why buy from Goliath?

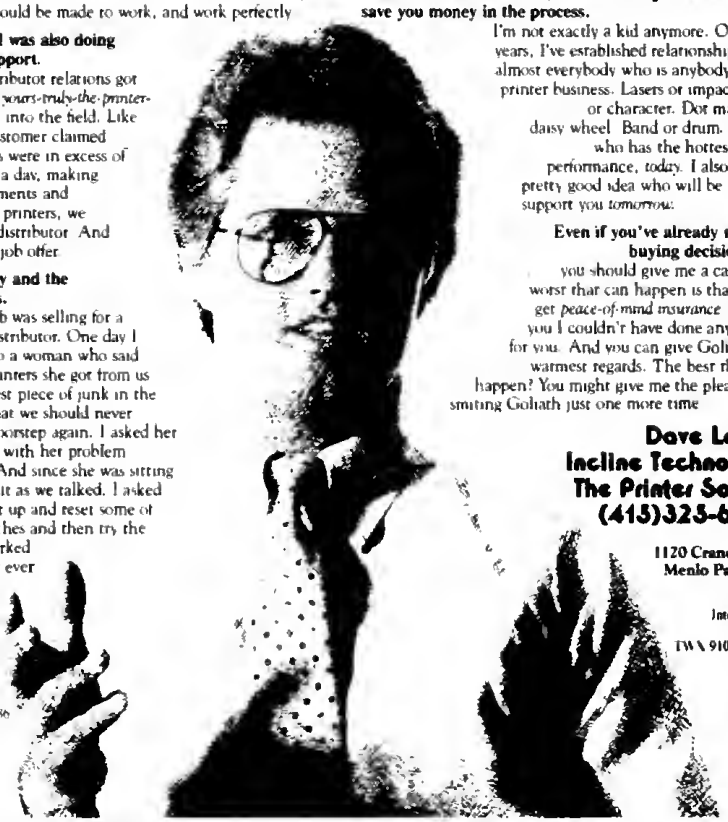
For the past ten years, I've sold every kind of printer imaginable. Those made in the USA, and those that weren't. Never before has so much been available from so many manufacturers. It's a full-time job just to keep up with it. Now, it's my job. My full-time job. There are many printers, from big companies, with armies of salespeople scrambling to find ... you. They really don't have your best interests at heart. They want to sell *their* printers. Period.

I can acquire virtually any printing capability you want, take care of all the details, research and justification, and save you money in the process.

I'm not exactly a kid anymore. Over the years, I've established relationships with almost everybody who is anybody in the printer business. Lasers or impact. Line or character. Dot matrix or daisy wheel. Band or drum. I know who has the hottest price/performance, *today*. I also have a pretty good idea who will be here to support you *tomorrow*.

Even if you've already made a buying decision . . .

you should give me a call. The worst that can happen is that you'll get *peace-of-mind insurance*. I'll tell you I couldn't have done any better for you. And you can give Goliath my warmest regards. The best that can happen? You might give me the pleasure of smiting Goliath just one more time.



Dave Lester
Incline Technology
The Printer Source
(415)323-6015

1120 Crane Street
Menlo Park, CA
94025

International Inquiries
TWX 910 2501537

*Anadex, Brother, Canon, CDC, Centronics, C.Itoh, Data Printer, Dataproducts, Datasouth, Diablo, Epson, Florida Data, Fujitsu, Genicom, Hitachi, Juki, NEC, Okidata, Primages, Printronix, Prism, Qume, Ricoh, Star Micronics, Toshiba, Xerox TRBA

NEC unveils 386-based PC

BY DAVID BRIGHT
CW STAFF

BOXBORO, Mass. — NEC Information Systems, Inc. last week joined the swelling ranks of vendors with Intel Corp. 80386-based systems by introducing the Powermate 386 personal computer.

With prices starting at $5,095 for a configuration with 1M byte of random-access memory, one floppy disk drive and one 40M-byte hard disk drive, the system is competitively priced; a similarly configured Compaq Computer Corp. Deskpro 386 lists for $6,499.

The announcement comes two months after NEC revamped its APC IV line of IBM Personal Computer AT-compatible systems in an effort to become a more aggressive player in the PC arena.

NEC is targeting the new system for applications such as financial modeling, computer-aided design and manufacturing, desktop publishing and scientific modeling, the company said. Shipments are scheduled to begin in July.

The Powermate 386 includes a 16-MHz microprocessor and space for five 5¼-in. internal disk drives, which can be combinations of 1.2M-byte floppy disk drives or 40M-, 66M- or 130M-byte hard disk drives. A high-speed enhanced small-disk device interface, hard disk drive controller is optional. Memory can be expanded to 16M bytes, of which 10M bytes can be 32-bit memory, NEC said. The basic system includes eight full-size expansion slots.

NEC is offering three graphics boards for the system: an IBM Color Graphics Adapter-compatible board, an Enhanced Graphics Adapter (EGA)-compatible unit and the AGB Plus, a new board from NEC that includes compatibility with both IBM's EGA and Hercules Computer Technology, Inc.'s Hercules Graphics Card.

With the new line of systems, NEC is attempting to break into the ranks of the first-tier vendors, said NEC's director of marketing support Dick Miller.

GET HALF-A-COMPUTER FREE WITH ORACLE VERSION 5

With ORACLE version 5, you save half the computer you thought you needed in order to "go relational"... some benchmarks indicate you save even more.

WHY IS VERSION 5 OF ORACLE SO FAST ON MAINFRAMES, ON MINIS AND ON MICROS?

□ **REASON #1: AI OPTIMIZES QUERY PROCESSING.**

V5 applies artificial intelligence to SQL query optimization. For example, few DBMSs can optimize the query "Select accounts 90-days overdue and accounts over $10,000." But only ORACLE can optimize "Select accounts 90-days overdue or accounts over $10,000."

□ **REASON #2: ARRAY PROCESSING OPTIMIZES ACCESS TO LARGE SETS OF DATA.**

Relational DBMSs have always dealt with **logical** sets of data. But they manipulated only one **physical** record at a time. V5 eliminates overhead by physically delivering arrays of hundreds, even thousands, of records at a time.

□ **REASON #3: PARALLEL-PROCESSING OPTIMIZES COMPUTER RESOURCE USAGE.**

V5 is 100% re-entrant shared code, and ORACLE's parallel-processing architecture fully exploits modern dyadic and quadratic processors from IBM, and other multi-processing computers such as those from DEC and Stratus. So ORACLE uses all the MIPS in parallel-processor configurations.

□ **REASON #4: MULTI-TABLE CLUSTERING OPTIMIZES JOINS.**

ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table clustering*—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transactions, etc.

□ **REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION**

Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, faster than previously thought possible.

□ **REASON #6: EFFICIENT ROW-LEVEL LOCKING OPTIMIZES TRANSACTION THRUPUT.**

Row-level locking and a read-consistency model optimizes ORACLE V5 transaction concurrency. For the first time, high transaction thruput is achieved by a fully relational DBMS.

THE ULTIMATE REASON

Oracle introduced the first relational DBMS and the first implementation of SQL back in 1979. Today ORACLE is installed on thousands of minis and mainframes, and over ten-thousand PCs. ORACLE is the only SQL-*compatible* relational DBMS that's *portable* across IBM mainframes, DEC, DG, HP and most other vendors' minis and micros, including the IBM PC. And ORACLE applications and databases are *connectable* across different hardware and operating system, providing you with a true distributed solution to your information needs.

Spend half a day at an Oracle seminar in your city, and find out how you can have the benefits of a portable, DB2-compatible relational DBMS... and save half a computer. Call our national seminar coordinator at 1-800-345-DBMS. Or write Oracle Corporation, Dept. V5, 20 Davis Drive, Belmont, CA 94002.

U.S. SEMINARS

AK Anchorage ..... Apr 14
AL Birmingham ..... May 22
AR Little Rock ..... May 13
AZ Phoenix ..... Apr 18, Jun 5
Tucson ..... Jun 20
CA Concord ..... Jun 10
Los Angeles ..... Apr 7, May 12, Jun 16
Newport Beach ..... May 5
Pleasanton ..... Apr 8
Sacramento ..... May 6
San Diego ..... May 14
San Francisco ..... Apr 9, May 14, Jun 18
San Jose ..... Apr 16, Jun 18
CO Colorado Springs ..... Apr 28
Denver ..... Apr 16, May 6, Jun 25
CT Hartford (Farm) ..... May 5
DC Washington ..... May 6
FL Tampa ..... Apr 8
GA Atlanta ..... May 6
HI Ewa Mokuna ..... Apr 23, Jun 17
ID Boise ..... Jun 4
IL Chicago ..... Apr 9, May 14, Jun 11
Springfield ..... May 7
IN Indianapolis ..... Apr 28, May 30, Jun 25
KS Wichita ..... Apr 2
KY Louisville ..... Apr 8
LA New Orleans ..... Apr 28, Jun 26
MA Boston ..... Apr 15, May 14, Jun 20
Springfield ..... Apr 1
MD Baltimore ..... Apr 7, Apr 28, May 19, Jun 4, Jun 18, Jun 18
Rockville ..... Apr 22, May 5, May 18
ME Portland ..... Apr 28
MI Detroit ..... Apr 7, May 12, Jun 9
Grand Rapids ..... Apr 9
MN Minneapolis ..... Apr 23, May 13, Jun 20
MO Kansas City ..... Apr 9, Jun 9
St. Louis ..... Apr 14, May 22, Jun 16
NE Omaha ..... Jun 2
NJ Iselin ..... Apr 1, Apr 28, Apr 29, May 12, May 19, Jun 11, Jun 25
NM Albuquerque ..... Apr 30
NV Las Vegas ..... Apr 1
NY Albany ..... Apr 22, Jun 17
Buffalo ..... Apr 8
New York City ..... Apr 8, Apr 16, Apr 22, May 6, May 14, Jun 24
Rochester ..... May 28, Jun 16, Jun 24
Syracuse ..... Apr 16
Tarrytown ..... May 14, Jun 11
OH Cincinnati ..... Apr 22, Jun 17
Cleveland ..... Apr 1, May 6, Jun 2
Columbus ..... Apr 3, May 6, Jun 3
Dayton ..... Apr 21, Jun 16
OK Oklahoma City ..... Apr 7, May 29
Tulsa ..... Jun 16
OR Portland ..... May 7
PA Allentown ..... Apr 21
Harrisburg ..... May 6, Jun 17
King of Prussia ..... Apr 23
Philadelphia ..... Apr 9, May 7, Jun 11
Pittsburgh ..... Jun 30
SC Columbia ..... Apr 7
TN Nashville ..... Apr 8
TX Austin ..... Apr 7
Austin ..... Apr 1, Jun 11
Dallas/Ft. Worth ..... Apr 14, May 5, Jun 9
Houston ..... Apr 9, May 7
San Antonio ..... Apr 2, Jun 10
UT Salt Lake City ..... Apr 23, Jun 18
VT Burlington ..... May 6
WA Seattle ..... Apr 7, May 12, Jun 24
WI Madison ..... Jun 23
Milwaukee ..... Apr 28, Jun 9
WV Charleston ..... Apr 16

CANADIAN SEMINARS

Calgary ..... May 19
Edmonton ..... Apr 14
Hamilton ..... Apr 22, May 19, Jun 16
London ..... Apr 28, May 26
Ottawa ..... Apr 2, May 7, Jun 4
Regina ..... Jun 16
Saskatoon ..... Jun 2
Toronto ..... Apr 7, May 12, Jun 9
Vancouver ..... May 14
Victoria ..... Apr 21
Winnipeg ..... May 5

ORACLE®

Call (800) 345-DBMS today.

COMPATIBILITY • PORTABILITY • CONNECTABILITY

Ottawa (613) 238-2381 □ Quebec (514) 337-0755 □ Toronto (416) 362-3275
ORACLE-U.K. (SURREY) 44-1-948-6976 □ ORACLE-EUROPE (NAARDEN, THE NETHERLANDS) 31-2159-49344

©1986 by Oracle Corporation. ORACLE® is a registered trademark of Oracle Corporation. SQL/DS, DB2 and IBM are registered trademarks of IBM. DEC, DG, AT&T, Stratus, HP and Bell Laboratories own numerous registered trademarks. TRSA.

Dylakor buttresses its DB2, SQL/DS support

Interface from division of Sterling Software links data base to 4GL, report-writing systems

BY JAMES A. MARTIN
CW STAFF

WOODLAND HILLS, Calif. — Sterling Software Inc.'s Dylakor Division announced last week further support of IBM's DB2 relational data base management system with a new interface for IBM's SQL/DS and an enhanced DB2 interface.

Dylakor's SQL/DS product reportedly links SQL/DS data bases with the company's fourth-generation language information management and report writing systems, Dyl-280 and Dyl-280 II. Using embedded SQL syntax, the interface acts as a front end, enabling Dyl-280 and 280 II users to access data within SQL/DS files. There are two versions of the Dyl-Interface SQL/DS system — one for IBM CMS environments and the other for IBM's VSE. Both versions are slated to be available in October and to be priced at $8,690.

Dyl-Interface reportedly enables users to combine two or more SQL/DS data base files. Utilities are said to include automatic copy, match, merge, sort, automatic translation of ASCII files and utilization of predefined Cobol data definitions.

DYL-INTERFACE reportedly enables users to combine two or more SQL/DS data base files.

"We expect this product to be functional immediately after installation for two reasons," said Dylakor President Carol Morton. "SQL is quickly becoming a standard, and many mainframe users are already familiar with Dyl-280 and Dyl-280 II's language."

Dylakor also announced Release 2.1 of Dyl-Interface DB2, a fourth-generation language data management system that retrieves and updates data information in DB2 files.

Enhancements are said to include the ability to retrieve a single row of data without the use of a cursor, the ability to create, alter and drop DB2 file definitions and access to DB2's Grant and Revoke security functions.

In addition, Dyl-Interface DB2 is said to join two or more DB2 files and to allow DB2 data to be integrated with data from other data base files, such as IBM's IMS or VSAM systems.

Dyl-Interface DB2 operates under MVS/TSO and any IBM mainframe supporting DB2, Dylakor said, and can be accessed in TSO or batch mode using either DB2's TSO Attach or Call Attach utilities. The new version is available now and costs $8,690. A retrieval-only version is priced at $6,380.

Other announcements made at Dylakor's first users group conference, held in Woodland Hills, included a VM/CMS version of Dyl-Calc, a mainframe spreadsheet software package. When introduced last year, Dyl-Calc operated under MVS or DOS/VSE operating systems only, requiring the use of CICS or TSO under MVS. Release 1.5 of Dyl-Calc will reportedly enter beta testing this fall and is set to be available by year's end for $6,000.

Look to the future with ESP.

Modern, forward-looking automated scheduling and processing control.

Don't get left behind with out-moded methods. Get ahead with ESP – simple, effective and efficient control.

ESP
EXECUTION SCHEDULING PROCESSOR

The only alternative.

Cybermation Inc.

Cybermation Inc.
10 Esna Park Drive
Markham, Ontario
L3R 5X1

Vive La Difference!

Progilog invites you to become a part of the French-speaking marketplace for software products

With 4,000 IBM and 10,000 VAX mainframes, French-speaking countries are still virtually untapped territory for software products. Despite the differences in language, ways of thinking and ways of doing business, your products can become a part of the growth with Progilog—the leader in the IBM and VAX software marketplaces

In particular, we are looking for:

- In-house E-MAIL products under VM or MVS
- DOS or CICS software products

And also for:

- Systems Software
- Performance Analyzers
- Expert Systems
- Network Products
- Capacity Planning Products
- System Tuning Products
- PC Products
- And much more!

For information, please contact:

G. Terrisse or Jean-Pierre Galand
24-26 Rue Louis Armand
75015 Paris, France
Phone. (331) 40 60 05 12 Telex 842205811 PROGILO F

PROGILOG

The leading independent French company in the software products business.

ALL OF THE COMPUTER PROS IN THE WORLD HAVE PASSED THIS SIMPLE TEST: ➡

Pull Here

CONGRATULATIONS...You passed!

Now take the next step Fill in the blanks below to get 51 issues of COMPUTERWORLD at the Low Introductory Rate of just $38 95 That's over $5 off the basic rate Plus you'll receive all 12 COMPUTERWORLD FOCUS issues with your subscription. Just look for our postage paid envelope that's bound into this issue!

☐ Payment enclosed ☐ Bill me
☐ Charge my credit card ☐ AmEx ☐ VISA ☐ Mastercard

Signature _____ Card Expires _____

FIRST NAME | M I | LAST NAME

TITLE

COMPANY

ADDRESS

CITY | STATE | ZIP

Address shown ☐ Home ☐ Office

☐ I m already a subscriber but I'd like to extend my subscription at this special low rate (Attach mailing label above)

Canada Central & South America $110/ Europe $165/ All other countries $245 (Airmail)
Foreign orders must be prepaid in U S dollars

Please complete the information to the right to qualify for the special introductory rate

Basic Rate $44

COMPUTERWORLD

Detach here place in envelope and seal securely

Please indicate your business function and computer involvement below

BUSINESS INDUSTRY Circle one
10 Manufacturer (other than computer)
20 Finance/Insurance/Real Estate
30 Medicine/Law Education
40 Wholesale/Retail/Trade
50 Business Service (except DP)
60 Government State-Federal/Local
65 Public Utility/Communications Systems, Transportation
70 Mining,Construction/Petroleum Refining,Agriculture
80 Manufacturer of Computers Computer Related Systems or Peripherals
85 Computer Service Bureau/Software Planning,Consulting
90 Computer Peripheral Dealer/Distributor Retailer
75 User Other _____
95 Vendor Other _____
(Please specify)

2 TITLE FUNCTION Circle one
IS MIS/DP MGT
19 Vice President Asst VP
21 Dir Mgr Suprv IS/MIS/DP Services
22 Dir Mgr Suprv of Operations Planning Adm Services
23 Dir Mgr Suprv Analyst of Systems
31 Dir Mgr Suprv of Programming
32 Programmer Methods Analyst
35 Dir Mgr Suprv DA/WP
38 Data Comm Network/Systems Mgr
OTHER COMPANY MANAGEMENT
11 President Owner/Partner General Mgr
12 Vice President Asst VP
13 Treasurer Controller Financial Officer
ENGINEERING
41 Engineering Scientific R & D Tech Mgt
SALES
51 Manufacturing Sales Reps Sales,Mktg Mgt
OTHER PROFESSIONALS
60 Consulting Mgt
70 Medical Legal Accounting Mgt
80 Educators Journalist Librarians Students
90 Others _____
(Please specify)

3 COMPUTER INVOLVEMENT (Circle all that apply
Types of equipment with which you are personally involved either as a user vendor or consultant
A Mainframes/Supermins
B Minicomputers/Small Business Computers
C Microcomputers/Desktops
D Communications Systems
E Office Automation Systems
F No Computer Involvement

3317-8721

Telecom seen enjoying power shift

BY DONNA RAIMONDI
CW STAFF

NEW ORLEANS — Telecommunications managers will wrest the control of information away from traditional data processing executives in the next decade, attendees at the International Communications Association 1987 Conference were told last week. But some attendees reacted skeptically to that assertion.

Communications applications will reach millions of end users in the next few years, fueled by the personal computer revolution, the growth of local-area networks and advances in data transmission speed and transport services, said keynote speaker Gideon Gartner, president and chief executive officer of the Gartner Group, Inc., a market analysis firm based in Stamford, Conn.

"There will be a power shift in favor of telecom over MIS," Gartner said. IBM has tried to bolster the power of MIS by giving it the tools necessary to manage and control networking, he added, but PCs have decelerated the trend of MIS control.

But inciting telecom managers to take power away from MIS is not realistic, attendee John Saccente, director of corporate telecommunications at Tenneco, Inc., said. "In the majority of companies, the organization is already in place, and if anyone takes control, it'll be MIS," he said. At Tenneco, telecom reports to MIS, which in turn reports to the financial management. The ideal is to have information systems, voice and data communications report to MIS, Saccente said.

Adversity not necessary

If managed correctly, the MIS and telecom control issues that many corporations are facing today do not have to be adversarial, said Alan Lusk, networking systems manager at Pepsico, Inc.'s Frito-Lay Division in Plano, Texas. In the past, the telecom people have been part of facilities management, while MIS has learned corporate politics and knows how to keep control. Telecom managers who want to get ahead should learn as much DP as possible, even if it means taking a career step backward to gain experience, Lusk said.

Getting management's attention is mandatory, agreed Michael Dortch, telecom analyst at The Yankee Group. "Telecom has to learn to play corporate politics."

Telecom managers should be talking to the CEO and the company's vice-presidents instead of hanging around in the basement, said T. Doane Perry, senior telecommunications analyst at Framingham, Mass.-based International Data Corp. There are turf battles going on among voice and data workers because voice workers are paranoid about not understanding data, and data people dismiss voice as simple, he said. But those battles take a lot of valuable energy to fight and bringing the two sides together is not the answer, Perry added. Giving each group equal status, with both reporting to a chief information officer, would work better, he said.

Disoss-telex link next on MCI agenda

BY ELISABETH HORWITT
CW STAFF

As part of its current international marketing thrust, MCI Communications Corp. is expected next week to announce software that permits documents generated by IBM's Distributed Office Support Systems (Disoss) to be delivered to telex terminals worldwide.

Currently installed at two major MCI accounts, MCI's Gateway Manager software translates Disoss-generated documents from IBM's Document Content Architecture into formats that can be handled by either MCI Mail or MCI subsidiary MCI International, Inc.'s store-and-forward telex service, Safe, *Computerworld* has learned.

The software does not interface with other vendors' telex services, MCI said.

Position strengthens

By providing Disoss users with access to the approximately two million telex terminals worldwide, Gateway Manager strengthens MCI's position as a full-service provider to multinational U.S. customers, MCI International President Seth Blumenfeld said.

"The U.S. data communications market is $50 billion to $60 billion, while the international market is a little over $1 billion, but international access can be a real turning point in getting a multinational account," Blumenfeld emphasized.

AT&T only recently began providing high-speed data internationally. The company does not provide a telex link, Blumenfeld said.

Translates, stores, sends

A Gateway Directory recognizes and translates Disoss addresses that are on MCI Mail or Safe. Documents are transmitted from the Gateway host to a Safe node via a dedicated Systems Network Architecture link.

The Safe system stores telex messages and routes them to the right address when a line is free.

Other Gateway Manager features include assignment of multiple inbound telex numbers with answer-back to Disoss mailboxes and generation of VSAM and System Management Facility call records of all messages for network management inquiries.

The Gateway Manager runs on any IBM host running MVS, MVS/XA, VTAM, CICS and Disoss.

Available immediately, it will be priced at $15,000.

Last week MCI announced that it would match AT&T's proposed 4.8% price reduction for interstate long-distance services in order to maintain its cost-advantage position over AT&T.

MCI's price reductions, like those of AT&T, pass along to customers savings that the carriers will realize from recent local-access charge reductions.

PBX lines receive major additions

BY ELISABETH HORWITT
CW STAFF

NEW ORLEANS — Two leading private branch exchange (PBX) vendors presented major additions to their product lines during the International Communications Association (ICA) 1987 Conference held here last week.

Ericsson Information Systems unveiled a low-end model of its MD110 Intelligent Network line of digital PBXs. Priced between $550 and $650 per line, the MD110 Model 40 reportedly supports up to 460 lines and 60 trunks and can be upgraded to support additional ports as well as enhanced functions such as voice mail. The company said initial shipments will begin in September.

Ericsson also announced a series of enhancements to the MD110 line, including the following:

- The Terminal Adapter Unit for personal computers, an expansion board that provides IBM PC users with simultaneous voice and data connections through the MD110. Scheduled to be available in July, the product is priced at $450.
- The Terminal Adapter Unit-Digital Multiplexed Interface (TAU-D), which allows an MD110 to support asynchronous data links of up to 19.2K bit/sec. and synchronous links of up to 64K bit/sec. The product is compatible with AT&T's DMI host-to-PBX interface. Scheduled for shipment in December, TAU-D costs $550.
- The DS-1 Digital Trunk Interface, which provides connection to AT&T networking services such as Accunet T1.5 as well as DMI-compatible links between an MD110 and host computer. Slated for availability in September, the DS-1 is priced at $3,500.

Also at the ICA show, recently formed Fujitsu GTE Business Systems, Inc. unveiled its "large-system digital PBX flagship product," the Omni SIV, which is said to support up to 10,000 lines. Incorporating the Integrated Services Digital Network (ISDN) Basic Rate Interface for terminal connections, Omni SIV "represents the future direction of our company" toward ISDN, Fujitsu GTE President John Toomey noted.

Banyan claims Vines/386 fully exploits chip

BY PATRICIA KEEFE
CW STAFF

WESTBORO, Mass. — Banyan Systems, Inc will demonstrate what it claims is the first network operating system to take full advantage of Intel Corp.'s 80386 processor at Comdex/Spring '87 in Atlanta next week

Intel 386-based software and hardware is expected to headline at Comdex, which is slated for June 1-4 (see story below).

Banyan is the second vendor to announce availability of a 386-based operating system. The Software Link, Inc. in Atlanta announced last week that it had shipped PC-MOS, the first 80386-based operating system for personal computers. The Software Link is said to be working with Novell, Inc. in Orem, Utah, to integrate PC-MOS with Novell's Advanced Netware network software.

A prototype of Banyan's Vines/386 network software will be shown running on Compaq Computer Corp.'s Deskpro 386.

Vines/386 is optimized to take advantage of the 386's 32-bit protected mode of operation and full adressing capabilities, Banyan said. Initial shipments are slated for the third quarter

The latest version of Vines will be fully compatible with Vines/286 and Banyan's family of Motorola Corp 68000-based network servers, the Banyan/BNS and Banyan/DTS. The compaoy added that it plans to support, as network servers, IBM's 80386-based Personal System/2 Model 80 and 80286-based PS/2 Models 50 and 60.

Vines/386 software will offer complete access to network resources, including sharing of files, disks, printers, modems and network applications — that is, services like Banyan Mail and network management. Streetalk, Banyan's global data base for identifying, locating and controlling access to users, services and resources, will also be supported.

The new software will include protocol support for communicating with minicomputers and mainframes or with larger networks that include additional Banyan servers for connection to IBM mainframes. A Vines/386-based server will allow personal computers attached to the network to emulate 3270 terminals over IBM's Systems Network Architecture/Synchronous Data Link Control protocols.

Pricing will be available at Comdex/Spring.

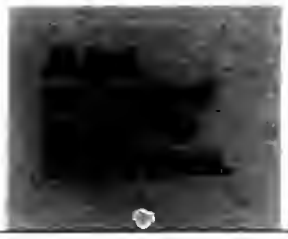
SQL/DS . . .
THE EASY WAY

Now SQL/DS database management can be easier and more powerful with VMSQL/EDIT—the new multi-function table editor from VM Software, Inc

With VMSQL/EDIT's full-screen display, even non-experienced SQL users can easily update data stored in SQL/DS tables

VMSQL/EDIT gives you a more powerful way to work with tables including the ability to update, insert, delete, and review on both single and multiple rows of tables It also includes a powerful macro facility that dramatically reduces the time needed to build ad hoc data entry applications.

To find out exactly how easy SQL/DS databases really can be with the right help, call today. We'll send you a free copy of the new SQL/DS Quick Reference Handbook just for calling.



Applied Relational Technology
A division of VM Software Inc

To get your free SQL/DS Quick Reference Handbook that gives you a complete listing of system catalog names, SQL commands built in functions as well as data type definitions and expression syntax, call today.

800-562-7100 OR 703-264-8000

VM SOFTWARE INC.
1800 Alexander Bell Drive
Reston VA 22091
Available only in U S and Canada

CWX 870525

Vendors chip away in Dixie

Comdex to feature second round of 386-based machines

BY DAVID BRIGHT
CW STAFF

The next wave of Intel Corp. 80386-based systems will hit Atlanta next week at the Comdex/Spring '87 microcomputer reseller show. However, 386 market leader Compaq Computer Corp. will not be among the exhibitors.

In addition to the many 80386-based products, the seventh annual show, which will run June 1-4, will also feature products relating to IBM's new Personal System/2 as well as add-in board vendor statements of direction concerning those systems, connectivity products and upgraded Intel 80286-based systems. Many attendees will also be taking their first look at the PS/2.

NEC Information Systems, Inc., NCR Corp. and Televideo Systems, Inc. are some of the more well-known vendors expected to highlight 386-based machines they introduced just prior to the show. Among the smaller vendors are names like American Computer & Peripheral, Inc., American Leading Systems, Inc. and Taiwan-based Mitac International Corp., which has developed a small-footprint system.

Compaq stays home

Despite the expected swarm of competing 386-based systems, Compaq has decided that "the return on our investment is just not worth it in our overall marketing plan," a spokeswoman said. Compaq was a prominent exhibitor at last year's show, but its decision is not indicative of any changes in the show's direction, said Dick Schwab, vice-president of project management for the show's sponsor, The Interface Group, Inc.

American Computer & Peripheral's desktop offering, configured with 1M byte of memory, a 40M-byte hard disk drive and an IBM Enhanced Graphics Adapter-compatible card, will start at $5,995. The company will also offer a tower version of the system.

Start-up American Leading Systems will be introducing its first product at the show. With one floppy disk drive, the Compaq-compatible 16MHz-system will start at about $3,500, a company spokesman said.

One of the first 20-MHz 386-based products to hit the market will be a motherboard from American Megatrends, Inc. Priced at $2,295, the board includes a zero-wait state processor, a socket for an Intel 80387 coprocessor and 1M byte of memory, expandable to 4M bytes. "We're claiming the greatest compatibility you can get," a spokeswoman said.

Officials at The Interface Group said they expect this year's event to be bigger than last year's attendance of 42,000 and that the show's health reflects the resurgence of the microcomputer industry after a two-year downturn. Preregistration is up about 60% from last year, according to Schwab. The show peaked in 1984, when it attracted 813 exhibitors and about 49,000 attendees. At press time, approximately 750 vendors had been signed up, compared with 600 a year earlier.

Some observers stress that Comdex/Spring is typically not so much a forum for new product announcements as it is a showcase for new products and a good environment in which to conduct business. "Atlanta has never been a big place for huge, whopping announcements. It's a place to do business," said Tom Roberts, an analyst with Framingham, Mass.-based International Data Corp.

ARE YOU STUCK?

Stuck with PL/I applications running only on mainframes or minis?

Language Processors, Inc., an innovator in compiler technology, has your solution. a PL/I compiler that rescues your applications from aging mainframes and from proprietary architecture minis.

LPI-PL/I allows you to retain your present PL/I investment by letting you port the applications to just about any UNIX or XENIX-based computer

LPI-PL/I is a true compiler that produces fast and compact machine code. You can select from several levels of optimization (local, global or machine dependent) to produce efficient applications And our LPI-DEBUG lets you test and debug programs in PL/I, not machine language.

LPI-PL/I is just one of an entire family of compilers. The LPI family allows you to develop every subprogram of an application in the LPI language best suited for the job, and then execute cross-language calls between the subprograms You choose the language – we will supply the compiler – with the support that made us stand above the crowd.

And next time you buy a computer, you won't be stuck – LPI languages will be on it

LPI-PL/I is a full implementation of ANSI PL/I X3.74-1981 General Purpose Subset It is compatible with DG and Prime implementations of PL/I and has extensions for compatibility with mainframe and DEC implementations Some of these extensions are SELECT BYTE LEAVE & REPLACE

Available on MC68000-based computers, such as Altos Apollo, Arete AT&T CT NCR, Sun and Unisys
NEW on AT&T 3B2 3B5 and 3B15 Series computers
NEW on Intel 80386-based computers

Call the LPI Retail Group now to order or send the coupon Prices start at $995 for 80386 machines

I need more information on LPI-PL/I for the following computers

I need more information on your other languages

Name Title (or attach your business card)

Address Phone

LPI
The Language Source

Language Processors, Inc
400 Totten Pond Road
Waltham MA 02154
Telephone 617 890 1155
Telefax 617 890 5633
Telex 951 671

CW325

LPI: PL/I, COBOL, RPG II, BASIC, FORTRAN, PASCAL, C, DEBUG

386 not alone in product limelight

Panasonic 11 page/min laser printer, modems, PS/2 add-ons to vie for center stage

BY DAVID BRIGHT
CW STAFF

While systems based on Intel Corp.'s 80386 chip will be very much in evidence at Comdex/Spring '87, there will also be several noteworthy peripheral, connectivity and IBM Personal System/2-related product announcements at the show.

Likely to attract a lot of interest is Panasonic Industrial Co.'s 11 page/min laser printer, which is priced at $1,999 — apparently making it by far the fastest laser printer priced under $2,000. "We plan to offer a serious challenge to other laser printer manufacturers," stated national marketing manager Jim Cullen. Called the Laser Partner, the unit is built around a Panasonic engine that uses technology from the company's copying machines. Cullen said Panasonic may use the printer to enter the desktop publishing business.

The printer provides 512K bytes of random-access memory (RAM), 300- by 300-dot resolution, five built-in printer emulations, a serial and a parallel interface and two letter-size cassettes. Emulations include the Hewlett-Packard Co. Laserjet Plus, IBM Pro Printer and Epson America, Inc. FX-85.

NEC to add printer

NEC Information Systems, Inc. reportedly will introduce a 30 page/min laser printer starting at $10,995. The printer is intended for minicomputers and mainframes as well as personal computers. The series also includes lower end models.

On the systems side, Grid Systems Corp. plans to announce a 2.4K bit/sec. internal modem and a 20M-byte internal hard disk for its laptop computers. The modem is priced at $595, the hard disk drive at $1,175.

Datavue Corp. reportedly will try to generate more interest in its Datavue 25 portable computers by cutting prices on those systems for the duration of the show. The company plans to offer its $3,495 portable with a 20M-byte hard disk drive for $1,895. Datavue's Snap and Spark laptop computers are not slated to be included in the promotion.

Hayes Microcomputer Products, Inc. plans to celebrate its 10th anniversary by announcing a new communications product.

LAN revamp

Fox Research, Inc. is set to announce a new release of its 10-Net local-area network (LAN) that includes IBM Netbios support. Fox will also introduce a multipurpose repeater for linking 10-Net LANs that use a twisted-pair bus and AT&T Starlan topologies.

Asher Technologies, Inc. is scheduled to announce a $395 card that allows a personal computer to send fax transmissions directly from data files without the need for printing out hard copy first.

Novell, Inc. is planning to reveal a major upgrade to its Asynchronous Communications Server.

Preparing for operating system and utility software that turns personal computers into multiuser systems, Arnet Corp. is set to introduce the Virtual Terminal Adapter for speeding up the response of the terminals on such systems. To be priced in the $1,500 to $2,000 range, the board uses an Intel 80186 microprocessor and dual-ported RAM and is also intended to provide for multitasking on dumb terminals.

As add-on board vendors rush to build products compatible with the PS/2, Quadram Corp. intends to outline its plans for that area. Orchid Technology, Inc. plans to announce memory boards for the PS/2 Models 50 and 60 as well as a Jetram board that speeds memory access on systems using the company's Jet386 accelerator board.

Several PS/2-compatible monitors have already come on the market. Among the companies slated to introduce new VGA-compatible monitors at Comdex are Tatung Company of America, Inc. and Thomson Information Systems Corp. Tatung plans to display a 12-in. black-and-white and two 14-in. color monitors. Prices for the color units start at $689. The high-end color monitor provides a resolution of 800 by 560 pixels, according to the vendor.

Thomson's multiscanning Ultrascan monitor is said to automatically adjust to various horizontal- and vertical-scan frequencies. The two companies' monitors are also compatible with the IBM Personal Computer.

Targeting the emerging desktop publishing market Cornerstone Technology should unveil a high-resolution 19-in. monochrome monitor for the IBM PC and Apple Computer Inc. Macintosh II. The $2,395 unit sports a resolution of 1,600 by 1,280 pixels.

Imagen a publisher

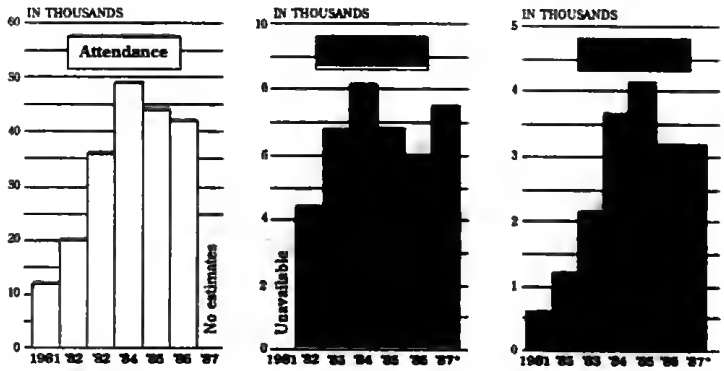
Also for desktop publishing Imagen Corp. is scheduled to formally announce its Document Description Language-based PC Publisher Kit. The board, which fits into an IBM PC, upgrades HP Laserjet printers by adding full-page graphics and extended font capabilities.

Apparently unslowed by its legal dispute with Lotus Development Corp., Mosaic Software, Inc. intends to introduce Revolver, a package designed to compete with Funk Software, Inc.'s extremely popular Sideways program. In addition to printing wide spreadsheets, the $69.95 Revolver reportedly allows the setting of directories and the customizing of fonts, among other features.

For speeding the creation of data base management applications under Borland International's Turbo Pascal comes the debut of Automated Software Concepts International, Inc.'s Turbo Ghostwriter. The $189 program is said to save up to 95% of a developer's coding time. Creator Tom Adams stressed that the program is for developers proficient in Pascal and is definitely not for the end user.

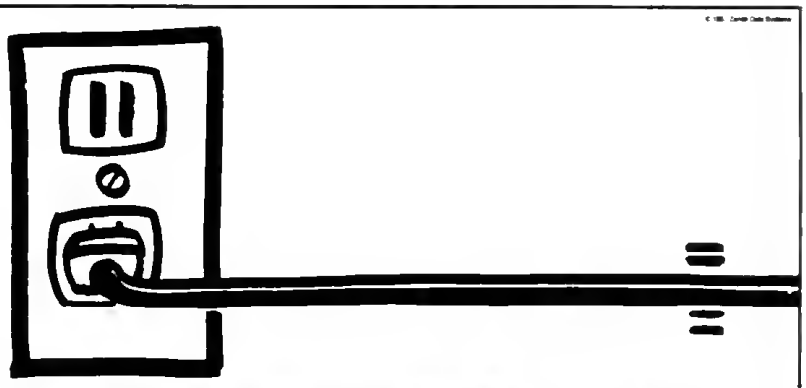
Comdex/Spring

Still thriving



* As of May 20

INFORMATION PROVIDED BY THE INTERFACE GROUP, INC.
CW CHART: MITCHELL J. HAYES



Without Zenith's Battery-Powered Hard Drive Laptop, Something Will Always Be Holding You Back.

Zenith's new Z-183 laptop has a built-in hard drive powered by a rechargeable battery. So you can run it anywhere, anytime. But don't think it's any less powerful. The Z-183 boasts 10 megabytes of hard disk storage, 640K of memory. And a 3½" floppy drive which can run most PC/XT compatible software. What's more, it features our top-rated, blue supertwist backlit LCD screen. For more information on Zenith's battery-powered hard drive, call 1-800-842-9000 ext. 1. And cut the cord.

ZENITH data systems

THE QUALITY GOES IN BEFORE THE NAME GOES ON

Novell Wrote the Book on LAN Environment Reliability.

No one knows local area network fault tolerance and environment protection better than Novell. We defined LAN fault tolerance. We pioneered LAN fault tolerance. And we've championed the cause of LAN fault tolerance for some time now. For one very good reason: because you can't afford to lose the data stored on your LAN.

Data Disaster Protection.

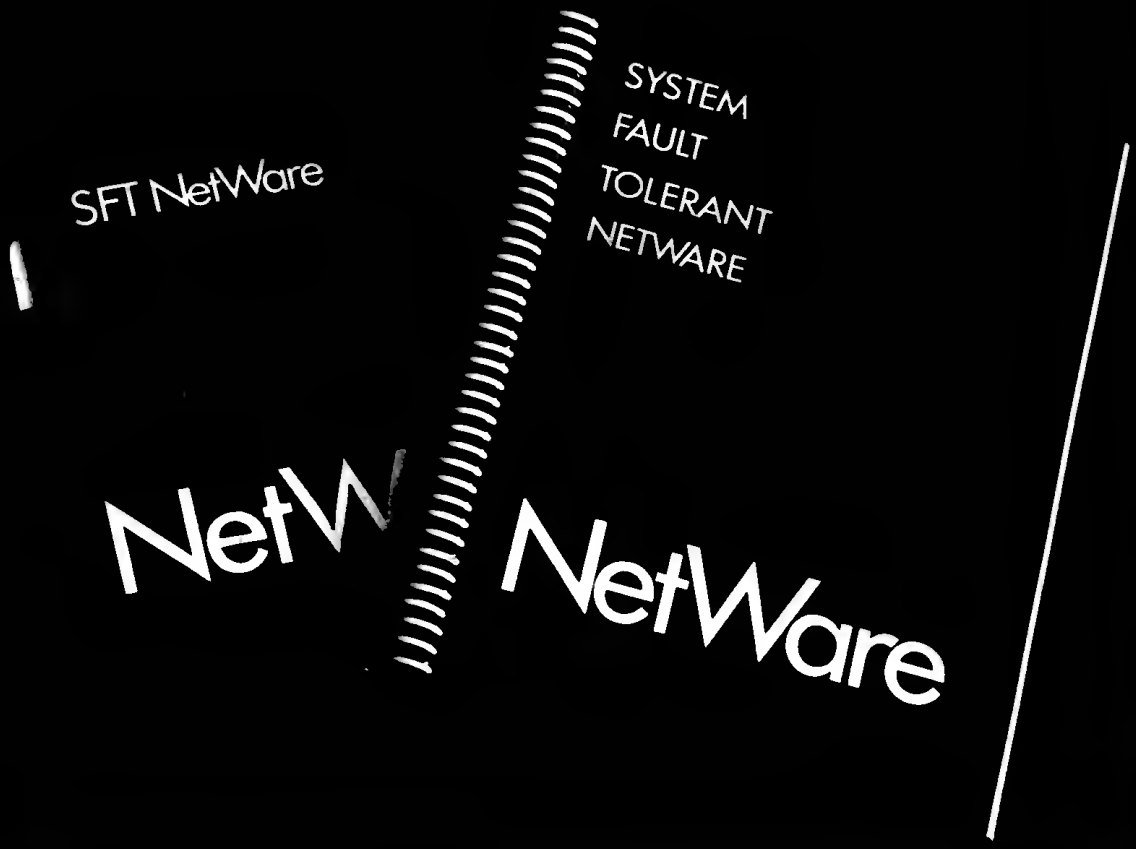
Without the fault protection provided by Novell's System Fault Tolerant (SFT™) NetWare and Transaction Tracking System (TTS™), your LAN is a data disaster waiting to happen. All it takes is a system glitch, hardware malfunction, disk error or (worse yet) a full-scale crash, and you could find

Compare Fault Tolerant Features.

No other LAN operating system software offers all the fault tolerant capabilities of SFT NetWare and TTS. Use this list of features to make your own comparison between SFT/TTS and any other LAN operating system.

	SFT NetWare Level II with TTS	Any other LAN operating system
Hardware-independent fault tolerance	•	
Duplicate directory structures	•	
Disk read-after-write verification	•	
Hot Fix™	•	
Disk mirroring	•	
Disk duplexing	•	
Transaction Tracking™	•	
Automatic rollback	•	
User-transparent data protection	•	
Multiple server support	•	

1987 Novell Inc World Headquarters 122 East 1700 South Provo Utah 84601 (801) 379 5900



yourself painstakingly trying to rebuild your company's most important database. And paying for it with costly network down-time.

TTS and SFT NetWare's various levels of fault tolerance give you the flexibility to choose the degree of protection required by your company's LAN. And because you can install TTS and SFT NetWare on your existing LAN hardware, you can safeguard your LAN from data loss for a fraction of the cost of minicomputer fault tolerant systems.

No-Fault Insurance.

How much is environment reliability worth? It's certainly worth the time to find out more about SFT NetWare and TTS.

Give the data on your LAN the protection it deserves, with SFT NetWare and TTS. Write Novell for a list of applications compatible with SFT/TTS. Or visit an Authorized NetWare Reseller or call 1-800-LANKIND.

For more information call from your modem 1-800-332-0012 (0-1200 baud, 8 bit, no parity 1 stop bit) and enter the access code NVSFT 3 when prompted. (In VA call 703-476-5255)

NOVELL®

Milestones Ahead.

Users bank on delayed Uccel financial software

BY ROSEMARY HAMILTON
CW STAFF

DALLAS — Uccel Corp. will announce a delivery date next month for its integrated loan package, an IBM mainframe-based banking application that was originally scheduled to be released this quarter. The company made the announcement last week at Infoweek, its user conference.

The statement is the latest effort by the vendor to appease users while it fine-tunes the long-awaited Infoloans package. Mindful of the problems that befell competitor Hogan Systems, Inc. when it released a malfunctioning loans package two years ago, Uccel has opted to proceed cautiously with its offering.

"We can't afford to be reckless with a product of this importance," said Uccel's Chairman Gregory Liemandt at the opening session of Infoweek, the Uccel Financial Systems Division users group meeting held here last week. "Until we feel very ready, we will not release it."

"This is our problem," added Donald Steele, general manager of the Financial Systems Division. "We didn't anticipate the amount of testing. We know it's causing some pain, and we appreciate you accepting that pain."

The company has 41 orders for Infoloans, the majority of which were placed in 1986, according to Steele.

While no new orders have been placed since the delay was announced, the company has not lost any accounts as a result, Steele said.

Timothy McCollum, vice-president of computer services and software at the brokerage house Dean Witter Reynolds, Inc., speculated that Infoloans will be out "in the fourth quarter, but a more reasonable expectation is first-quarter 1988."

A 1988 delivery date is acceptable to Michael Paolantonio, a vice-president at Multibank Financial Corp., a bank holding company in Dedham, Mass.

Paolantonio said he is comfortable with a one-year wait, but beyond that, "it really becomes critical as to how much more money you should be putting into your current system.

"I do have flexibility right now, but the longer [the delivery date] is moved out, the less flexible I become," he said.

"At first, it messed us up a bit, but the system seems so strong that we haven't considered going to another vendor," said Gary Nichols, vice-president of operations control at First Fidelity Bank NA in Pleasantville, N.J.

"We planned on it for 1987, so we had to reassess our plans," said a vice-president from a Pittsburgh financial institution who requested anonymity. "It is frustrating, and it would be very helpful if we had a date. But this approach — to give us a good product with no bugs — is a key point. We feel comfortable."

Yet another user said Uccel has soothed his company's concerns regarding its overall financial software purchase plans. The Morris County Savings Bank in Morristown, N.J., is evaluating Infoloans for purchase in two or three years. In the meantime, Uccel has committed itself to supporting its individual loans packages until 1990.

Flaws discovered in beta test

Uccel officials attribute the postponement of Infoloans to an unexpected and considerable amount of work the product needs, a fact that Uccel said was not realized until Infoloans went out to beta-test sites in December 1986.

The software is a highly complex product that came out of a three-year research and development effort formerly known within Uccel as the Leap project. Designed to run in an IBM MVS environment like Uccel's other financial software products, Infoloans would serve as a master system to manage and process all loan activity.

JOIN THE TANDY® TEAM.
No other VAR lineup measures up.

Tandy's All-Star lineup of products, marketing and support are second to none. That's why you need Tandy—a seasoned pro—as your hardware vendor.

With Tandy's new Value-Added Resale Program, you'll get an impressive lineup of features including industry standard products, full one year warranty on Tandy computers, competitive discounts and strong aftermarket service and support.

It's a complete VAR program to give you a decisive edge in selling against your competition.

A Super Game Plan
Tandy VARs have no annual volume commitment. Discounts are based on the number of computers ordered at one time. You'll receive additional discount points for leased orders and bonuses based on quarterly purchases. Our player's contract covers all products, and includes extra incentives for VARs who sell network and multiuser systems. There's even a convenience buying option which allows Tandy VARs to purchase selected accessory items from Radio Shack Computer Centers at a discount.

Take a Quick Time-out
To learn how your business can take full advantage of the new Tandy VAR All-Star lineup, write or call today. And be sure to visit the Tandy Booth #1362 at Spring COMDEX, Atlanta.

Tandy Corporation
Value-Added Resale
1400 One Tandy Center, Fort Worth, TX 76102 (817) 390-3099

MDBS develops Guru for VAX

BY JEAN S. BOZMAN
CW STAFF

LAFAYETTE, Ind. — MDBS, Inc. is planning to release a version of its Guru expert system software for Digital Equipment Corp. VAX machines next month. The new versions, written for the VMS and Ultrix operating systems, reportedly took two years to develop.

Guru combines a built-in relational data base management system with spreadsheet- and forms-management software. It currently runs only on IBM Personal Computers.

Both the VMS and Ultrix versions of Guru should include Guru Version 1.1 features, which support full record- and file-locking capabilities. The VMS version will be available in June, MDBS said, while the Ultrix version will ship in July. Guru Tutor, a how-to manual for building expert systems, is included with the VAX Guru products, MDBS said.

Prices for the VAX versions will range from $17,000 to $60,000, depending on the size of the VAX configuration, MDBS said. Guru is priced at $6,500 for the IBM PC and DEC Vaxmate.

Joint videotex venture set for 1988 launch

Analysts skeptical, say IBM-Sears product no better than previous failed services

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Trintex, a partnership between IBM and Sears, Roebuck and Co. that is intended to prove that a U.S. videotex service need not be a failure, is preparing to launch its microcomputer-based service early next year.

At an information industry conference last week, a Trintex executive disclosed some general details about the service and predicted that it will boost sales of personal computers, including the IBM Personal System/2 family, by increasing their usefulness.

Harry E. Smith, vice-president of product and commercial development, said Trintex will provide a variety of information and transaction services for "time-starved" urban professionals, including personalized news summaries, airline reservations, shopping, financial transactions, messages and games. The videotex service will begin in several cities in early 1988 and become available nationwide by 1990, Smith said.

But analysts said they doubt that Trintex, about two years behind its original schedule, will be any more successful than previous failed videotex systems in the U.S., such as Knight-Ridder, Inc.'s Viewtron in Florida and The Times Mirror Co.'s Gateway service in California.

Not likely to turn a profit?

Bernell Wright, an analyst for Link Resources Corp. in New York, said he is skeptical about Trintex because it is not dramatically better than previous videotex experiments, which had high telecommunications costs and failed to attract consumer interest or long-term advertiser support. Wright said videotex is unlikely to be profitable until the divested Bell operating companies are allowed to enter the information services market. The telephone companies would not be dependent on advertising revenue because they could profit directly from the increased traffic on their local networks.

"It's difficult to imagine a sustainable, profit-making [videotex] business without the direct support and leverage of the public-switched telephone network, which the telephone companies have," Wright emphasized.

Trintex, based in White Plains, N.Y., was founded in 1984 by IBM, Sears and CBS, Inc., but CBS dropped out last fall due to budget cuts. Trintex is costing IBM an estimated $25 million a year

Trintex's Smith said the forthcoming service requires a 1,200 bit/sec. modem, a monochrome or color monitor, a graphics card and a Trintex software diskette. The software helps to identify the user, automatically dials up the local Trintex office and translates the incoming data stream to the format used by the microcomputer, Smith explained.

To create a nonthreatening environment for novices, Trintex has developed a user interface with English commands that works for all of the information and transaction services, he added. Users will obtain the service via local telephone lines for a flat monthly fee, Smith said.

Firm upgrades desktop package

BY CLINTON WILDER
CW STAFF

MOUNTAIN VIEW, Calif. — Software Publishing Corp. today is scheduled to announce an enhanced version of Clickart Personal Publisher, its entry-level single-user desktop publishing program.

Called PFS:First Publisher, the product reportedly includes algorithms for improved dot matrix printer output and runs three times faster than Clickart Personal Publisher. The product will be available June 15 at the introductory price of $99, the firm said.

"First Publisher is aimed at the entry-level user who might have seen a high-end package like Aldus Corp.'s Pagemaker and knows what desktop publishing can do," said Linda Gill, PFS:First Publisher product manager. "It's for business people with word processing who want to make simple business documents look better."

PFS:First Publisher is said to allow users to integrate documents from word processing programs with professionally drawn graphic images and headline fonts and to create page layouts.

The product reportedly incorporates Software Publishing's enhancements to Clickart Personal Publisher, which the firm acquired from T/Maker Co. in July 1986.

PFS:First Publisher enhancements reportedly include much smoother edges on dot matrix image outputs, the ability to work with ASCII files up to 100 pages long and the ability to directly read files from Software Publishing's PFS:First Choice, PFS:Professional Write and PFS:Write.

EDITORIAL

Is it too late?

The sad tale of the National Computer Conference offers ample proof that too much success can be deadly. Although there are a handful of factors that contributed to NCC's demise, last week's report [CW, May 18] on the decline of the once-preeminent trade show clearly shows that the American Federation of Information Processing Societies and other show sponsors were riding an out-of-control train.

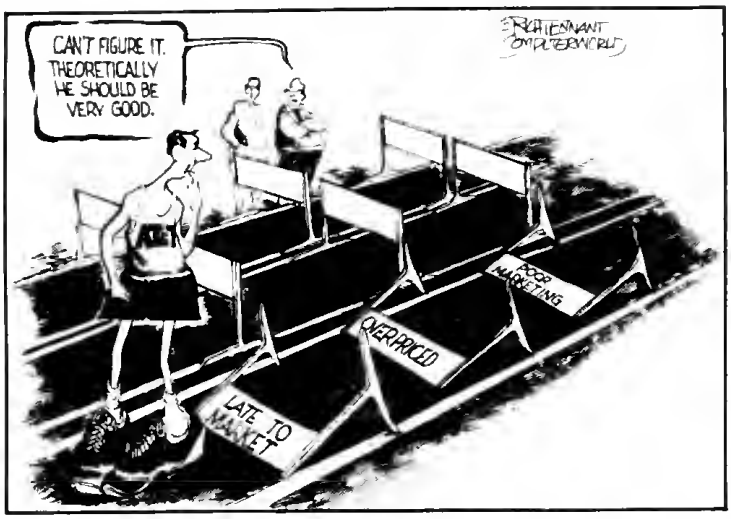
In retrospect, it seems that the mammoth number of exhibitors and MIS turnouts for NCC '82 and NCC '83, while undoubtedly lucrative for the sponsors, was in fact akin to the unbelievable growth rates briefly enjoyed by the early personal computer-clone vendors, many of whom rapidly tumbled into bankruptcy as the industry matured. With attendance approaching 100,000 and exhibitors numbering 700, attendees couldn't see all they wished.

The sponsors cannot be faulted for factors beyond their control: The explosion of the information industry; the ebb and flow of the economy; and the lure that NCC held for both vendors and users in the early 1980s resulted in the annual event becoming so large that it could be only be hosted in Las Vegas or Chicago.

But it is obvious that those sponsors lost touch with their constituents. Whether it was because of the show's size in 1982 and 1983 or the shift in location to Las Vegas in 1983, the user community voted with its feet, and it voted no. Even though more vendors were attracted to the desert setting, registered attendance in 1983 plunged to 65,000 from 97,000 the year before. Visitors didn't return to Chicago in 1984 — although registered attendance was ballyhooed as 85,000, NCC organizers now condede that 20,000 failed to show up. With attendance declining, vendors began to shun the event and thus began the downward spiral that some observers believe could result in this year's NCC being the last

No focus! Too big! Those comments come through too often and too loud to be ignored. By welcoming exhibitors of such far-flung products as cleaning solutions and by failing to pay attention to the rise of the microcomputer, NCC's organizers became a hungry dinosaur unaware of the impending Ice Age. The problem was worsened by NCC's lack of professional management and its clunky reliance on regional groups of volunteers to pull the event together — encouraging volunteerism is admirable, but too many committees can be stifling.

NCC organizers claim to have learned from recent lessons. They claim to recognize the importance of microcomputers and are shopping for professional management for future shows. The question is whether there is any time left. This year's show promises to be the worst ever — just last week NCR Corp. decided to pull out. NCC, unfortunately, may be faced with another riddle: When a tree falls in a forest and there's nobody around to hear it, does it make any noise?



LETTERS TO THE EDITOR

Vaporware is such

The Special Report on IBM's new microcomputer line [CW, May 4] contains a major, persistent misstatement of fact.

An array of products with claimed delivery dates from one to two years from now are referred to in the present tense, as though they in fact existed. While the products may eventually do what is now claimed for them, they do not exist, and in some cases it is unclear whether their specifications yet exist.

Vaporware is vaporware, whatever your opinion of the issuing company, and you do the community a disservice by not sticking to the facts.

Neil Rest
Chicago

Pay notice to Apple

I am in hearty agreement with Paul Whittington, who questioned the unbalanced coverage given by *Computerworld* to reports of future multiuser extensions in IBM and Microsoft Corp.'s OS/2 and Apple Computer, Inc. Macintosh operating systems [CW, May 11].

In my opinion, this is just one example of a pattern of editorial coverage that consistently ignores or downplays the contributions made by Apple in today's microcomputer market.

I cannot help but be amused when I read learned discussions about desktop publishing in which the Macintosh is mentioned only peripherally — despite industry estimates that Apple has roughly 80% of the installed base of these systems — or articles on trends in networking that make no mention of Appletalk, when this low-cost, low-maintenance system outsells all other networking products in the retail computer channel.

With the SE and Macintosh II hardware and Appleshare and A/UX software, Apple is working hard to answer legitimate corporate concerns about connectivity and open architecture. And Apple's own operating system, with an installed base of more than one million users, can no longer be considered "quirky" or "obscure."

Gary R. Voth
Technical Writer/
Microsystems Programmer
Formula Consultants, Inc.
Anaheim, Calif

This week in history

May 23, 1977
Recent suggestions by the federal Commission on Postal Service that the Postal Service should consider cutting Saturday delivery in order to cut costs have met with widespread congressional disapproval, while its suggestion that the post office consider providing electronic mail and an electronic message system has been virtually ignored, Capitol Hill observers say.

May 24, 1982
French statesman and author Jean-Jacques Servan-Schreiber warns that by 1990, 50 million people in the industrialized Western world will be jobless because of advancing high technology. "The savage forces of a scientific and technological revolution without precendent have not been tamed yet," he says.

Not historic yet

It is always good to see a long-standing controversy resolved as emphatically as it was by C. J. Date when he stated in "Debunking the myth of relational systems" [CW, March 30] that "The relational performance myth is finally debunked once and for all. It is a milestone in data base history."

Therefore, it is with some trepidation that I raise a few minor points about the debunking so soon after the historic milestone:

- After more than a decade of struggling with the IMS proponents within IBM, it must give Codd and Date Consulting Group a great deal of satisfaction to move up into the same performance league with IMS Fast Path. However, IMS has never been considered a high-performance system except when compared with relational systems. In fact, even IBM does not use IMS for implementation of internal systems that require very large data bases and where performance is critical.
- Perhaps more significant is the fact that the performance results cited are probably more indicative of the performance of Tandem Computers, Inc.'s operating system than they are of relational performance. Is Date really saying that a relational system can achieve Fast Path performance when both are operating under IBM's MVS/XA?
- While not wishing to question the objectivity of either the benchmark or Codd and Date, I would question whether the benchmark reflects the potential performance impact of "joining" large relational tables — a price that must be paid for the ease of use and flexibility that makes the

Continued on page 22

Future monitors: Display's the thing

CHARLES P. LECHT

The computer display provides the only real-time window to the inner workings of computer systems. As such, it is a very important device. Yet, despite all the improvements made in the technology in the past years, few have corrected the most basic defects found in our earliest displays — they are too small, hard on the eyes and expensive.

In many of today's portable and desktop systems, the supplied display is virtually unreadable. It seems their designers expected the screen would be read by one of those bank robots commonly used for reading the funny numbers at the bottom of a check. In all cases, the location of the viewer vis-a-vis the screen is critical to viewing anything, and a close proximity to the computer is generally required.

However, relief isn't far off. From what I've seen lately, I expect some display technology breakthroughs to take place

The 37-in. screen

For example, at last month's Communications '87 trade show in Tokyo, I noticed a new display being used by exhibitors — one that has yet to make its debut in the U.S. but whose announcement is imminent. It is an intelligent red-green-blue (RGB) and VHSC display monitor with a 37-in. screen offered by Mitsubishi Electric Co.

"Intelligent" describes the monitor because it can adapt to accept the signal of almost any computer system commonly offered today, including personal computers, word processors and computer-aided design processors. Called the XC-3710/XC-3720, it is the first 37-in. display monitor.

Those of you who question the importance of this introduction have probably never tried to present computer-produced results on a standard 14-in. PC display monitor to a group of 10 executives. With heads bobbing to get a better view and the puff of one guy's cigar smoke blanking out the entire display, it can be a grueling experience

With the Mitsubishi display, the group can see the results on a virtually flat screen the size of a two-page spread from *The Wall Street Journal* while sitting comfortably at a reasonable distance from it and one another. And the screen is much brighter than any standard phosphorescent tube being offered.

I have little doubt that many companies will follow Mitsubishi's lead and produce similar or possibly better displays. Future displays will feature ever thinner large-screen environments until, at last, they will be paper-thin and flexible.

The next real breakthrough will undoubtedly involve systems that offer the ability to project a computer system's output on a wide variety of receiving media and in broad daylight. This capability will eliminate our need to face a tube with the data inscribed from within.

When this happens, the window into our computer technology will have been relieved of its glass front once and for all. Following the solution to the projection problem, we can expect the three-dimensional variety to emerge. After we have suffered through a number of attempts involving the use of special eyeglasses, a breakthrough will occur freeing us of their need.

FUTURE displays will feature ever thinner large-screen environments until, at last, they will be paper-thin and flexible.

Large-screen 3-D computer-generated real-time projection will whet our appetites for holography, the be-all and end-all of computer wizardry. By this time, massive memories of a terabyte and picosecond processors will grace our desktops.

First enclosed in window spaces no larger than current displays offer, holographic pictures and data will appear as ghostly manifestations, hovering, confined and unnnving

Later, these images will move while providing us with faithful reproductions of the reality we so fervently hope to recreate And much later, the window space will grow so large that images will seem to burst from the box in which they were previously confined and surround us

Then we will have entered the window to the world of computers to look from the inside out and see where we've been and rejoice in not being there anymore

Lecht is chairman of Lecht Science, Inc., Japan, a Tokyo-based software think tank specializing in graphics. He is also an elected public member of the Hudson Institute and a free-lance writer on science topics.

Enhancing life after standards

Diversification prospers when products operate under a single umbrella

FREDERIC WITHINGTON

During the last decade, spreading standards seemed to be squeezing all computers into a few families of clones. But now it appears that a rich diversity of machines will develop under the standards umbrella. IBM's new Personal System/2 confirms the trend.

In the good old days before the IBM 360, new computers had a uniqueness. Whenever one was announced, the community would rush to look at it. Sure enough, there would be a new logic or storage component, a new word length or addressing scheme, maybe a new I/O buffering method.

But with the 360, IBM ushered in the age of compatibility Recognizing (correctly) that users' software investments now precluded buying incompatible machines, manufacturers became reluctant to introduce architectural innovations.

In time, standard operating systems and communications architectures were added to the list of constraints on designers, and innovation slowed to a crawl

Minicomputers brought a new freshness, but again, success led to ossification. At first, every one of Digital Equipment Corp.'s machines was different. But since the success of the PDP-11, DEC has brought forth only one major innovation — the VAX — and that's it for the foreseeable future.

Squelching innovation

So again with the personal computer. Each one announced in the late 1970s was different and innovative. Then the success of the IBM Personal Computer squelched innovation. Except for a few niches, other vendors were forced to offer IBM clones.

But a new freshness is raising its head — there's life after standards. We are beginning to see that diverse machines can interoperate under a single I/O, OS and network architecture

This trend to diversity is most evident among scientific systems. Under Unix and Ethernet users are not only interconnecting VAXs and 370s, they are also internetworking vector machines, parallel machines and autonomous workstations

Vendors are responding as well: The very-long-instruction-word Trace computer and the Connection Machine are as novel as any computer has been for a long time

The trend can be seen in PCs, too. IBM's PS/2 provides a Micro Channel with a standard interface for connecting modules that operate independently of the main system (coprocessors). More simultaneous memory accesses are supported than before, and IBM's OS/2 operating system supports overlapped operation of the modules.

PC coprocessors were already popularized in recent Macintoshes, the IBM RT Personal Computer and other machines. File servers, image processors and other specialized machines that form transparent network-connected extensions to PCs are also appearing

Even the stodgy mainframe products are diversifying. Tandem Computers, Inc. showed that fault-tolerant transaction processors would be accepted by users for use as nodes in preexisting communications architectures. Specialized front-end processors are available as are back-end file processors from such firms as Teradata Corp. and Britton Lee Inc. IBM itself already plays the specialized attached processor game with the 3090's Vector Facility

The trend to application packages fostered this product diversification. For instance, few users would have the specialized knowledge to program the graphics coprocessors they are buying for their PCs. Given bundled software packages, however, the market has taken off

Future standards should accelerate the diversification Higher levels of the International Standards Organization communications model and Integrated Services Digital Network will permit increasing diversity of transparent interconnection

Most important of all may be IBM's recently announced Systems Application Architecture. Intended as a defensive standard architecture to foster porting of programs across IBM's four product lines, it may also permit porting across many more.

Future technology will also enhance diversification Large gate arrays and application-specific integrated circuits make it easier to design unique logic. Huge memory chips make the storage of multiple operating systems tolerable Array processors and optical storage foster image processing, and inference chips and list processing architectures foster artificial intelligence.

It is hard to think of anybody who is hurt by this trend, except maybe offshore suppliers of clones. Users benefit — they have the option of remaining all conventional and being no worse off or using the novel products without compromising their overall standards environment

Small companies started up to exploit a new product idea have the best chance to develop the best chance to develop the novel processor business — or they can be content to benefit from the market expansion for conventional processors or peripherals that should be stimulated by the innovative product

Maybe best of all, the business is more fun for us to live

A 30-year veteran of the computer industry, Withington was a vice-president of Arthur D Little Inc. and is now an independent consultant. He has written four books and more than 60 articles and papers.

Historic

CONTINUED FROM PAGE 20

relational model so attractive. Or, is Date telling us that the inherent performance penalty of "join" is a relational myth?

We have some things to thank Codd and Date for, but resolving the data base performance controversy "once and for all" is not one of them. Too bad — it is a real bore.

As long as we are on the subject of data bases, thanks to Charles B. Holleran of IBM, who wrote a letter that correctly pointed out there is a big difference between distributed data management and a distributed data base [CW, March 30].

We do not need any more simple solutions to complex problems.

Tim Tyler
Principal
S. S. Tyler & Associates
Mountain View, Calif.

Creativity contradiction

William Harrison's "Over the rainbow in a software garage shop" [CW, April 27] offered more wistful reverie of the creative good life than balanced insight into the problems of producing creative software solutions. His argument, based on the successful garage shops and coding skunk works, is not countered with a legion of unsuccessful examples.

The creative losses Harrison associates with structured controls is substantially overdrawn. The oppressive manager he identifies is an aberrant form, but, given the choice, that manager is in some ways preferable to the hackers insistently anchoring the other end of the scale. A multihacker garage will not get you one functioning system but a factorial form of solutions to a set of problems seeking definition. But Harrison was not talking about hackers. Neither have advocates of structured systems development been talking about totalitarian management. The substantial literature on these methodologies offers sufficient elaboration.

Yes, there is a creative symbiosis that arises from diverse and subtle personal and interpersonal factors one may be privileged to enjoy at rare intervals in one's life, if at all. Hardly anyone can actively create these circumstances, but almost anyone can destroy them. Harrison's views would have been more acceptable if he had offered this recognition with the other essential view that, symbiosis or not, the work typically must continue.

Harrison offers sound advice when he cautions that creativity not be stifled. When he suggests that creativity can be created by sound management practices, but yet somehow not managed, he contradicts himself and leaves the question as he found it.

Joe H. Jones
Professor
University of Arkansas
Fayetteville, Arkansas

Denormalizing data

William Inmon's Soft Line column, "Denormalize for efficiency" [CW, March 16], was excellent. However, I think the drawbacks to denormalization were underemphasized in two areas — one subjective and one technical.

The first is the case for normalization itself. One normalizes data for ease of query and maintenance. A slight increase in CPU time seems a small price to pay for a savings of man-months of effort in development and maintenance.

Second, denormalization has its own performance price to pay. Every violation of normalization negatively affects every process that changes the data values, such as hard-coded changes that need to be included in every process and therefore maintained.

In Inmon's example, adding supplies to the Part file would cause a considerable increase of I/O to answer the simple normalized question of which parts are supplied by ACE Hard.

Perhaps your experiences have been with relational data base management systems that do not perform efficiently with joins. If the relational DBMS is smart, however, unnecessary duplicate I/O's are eliminated; good buffering, clustering of indexes and proper index selection can provide efficient retrieval without increasing update processing I/O.

As Inmon mentioned, there are some extreme cases where data should be denormalized. However, each violation of normalization needs to be clearly justified, documented and publicized not only to the software development staff but also to the end users of the data in order to prevent interruptions or surprises during regular access procedures.

Paul Bass
Software Support Manager
Computer Representatives, Inc.
Sonta Clara, Calif.

Clarification of DB2

Your coverage of our DB2 Data Dictionary was well balanced [CW, March 2]. However, I would like to point out, for the record, some incorrect information in the article.

First, our DB2 Data Dictionary referred to was never prototyped at New York State Employees Retirement System in any way, shape or form. We simply gained much of our DB2 knowledge there. Second, the application at New York contained in the area of 300 screens, not the workbench functions.

Barry Brown and Lewis Stone
Brownstone Solutions, Inc.
New York, N.Y.

Plug Any ASCII Async Printer Into IBM 3274

Immediate host access and 3287/3289 emulation.

Now you can use virtually any asynchronous printer any place you can plug in an IBM 3287.

Connect an HP Laser Jet, Xerox 2700, NEC Spinwriter, Epson FX-80, Okidata ML92 or an IBM Proprinter to your mainframe host.

The choice is yours from hundreds of brands and models with baud rates to 19.2K bps and parallel print rates to 26 pages-per-minute!

This *newest* InterLynx 3287 is easy to install. Configure it from virtually any async terminal connected to the serial port or use the convenient front panel.

(Options are stored in non-volatile EEPROM.)

What's New?

- Printer setup strings are now user definable, making it easier to work with laser printers
- Pseudo-transparency triggering is now user definable and allows taking direct control of the ASCII printer generating computer graphics, alternate character sets and other device unique outputs
- Print rates are now up to 26 pages-per-minute
- Translation tables are now easily user modified
- Xerox's SNA SCS code 36 is now supported

But Some Things Don't Change.

InterLynx/3287 is still an easy to use printer interface connecting inexpensive ASCII async printers to IBM 3274. It's easily connected to the host and for pennies a day gives steady, reliable service.

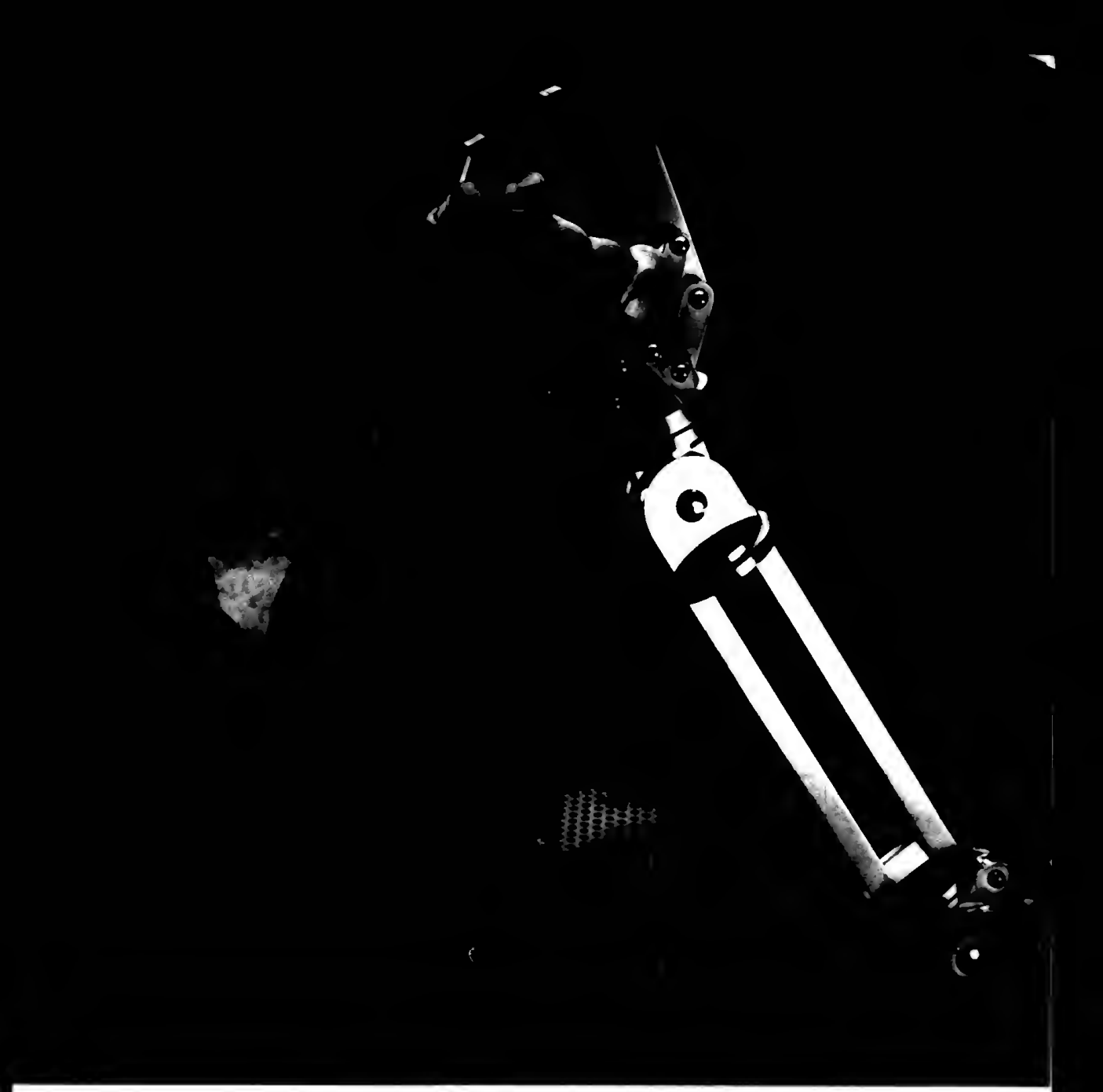
More than 7,000 InterLynx 3287s are in use worldwide. They're backed by a 12 month warranty and an experienced tech support team.

Get the full story today. Call (213) 320-7126 for more information and the name of your nearest factory representative. In Canada call (613) 748-9751. In UK call (0753) 76537.

"Your Lynx" to IBM

LOCAL DATA

2771 TOLEDO STREET TORRANCE CA 90503 TLX 182518



WITHOUT DATA GENERAL, INTEGRATING YOUR COMPUTERS IS LIKE PITTING MAN AGAINST MACHINE.

DATA GENERAL GIVES YOU THE BEST SOLUTIONS FOR COMPUTER INTEGRATED MANUFACTURING SYSTEMS.

Are the levels of your manufacturing operation locked in hand to hand combat? Our total integration solutions can make them all work together. Hand in hand.

The full range of our computers and solutions spans key areas. So engineering can tie in with manufacturing. Planning and control can communicate with sales and administration.

We give you advanced productivity solutions. With TEO,™ our technical automation system. And with CEO,® our business automation system. Each further streamlines your operations when they're combined with major CIM applications.

Data General is firmly committed to industry communications standards. Like MAP, SNA, X.25 and Ethernet.® They give you even more flexibility. And help you forge different systems into a single information mainstream.

What's more, our MV/Family computers are price/performance leaders. Which makes these solutions more affordable.

Our global support team can mold manufacturing solutions to fit almost any need. Whether it be production of steam turbines. Or manufacturing paper products. Companies wrestling with today's complex manufacturing needs have discovered integrated solutions from Data General.

To find out more, call 1-800-DATAGEN (in Canada call 1-800-268-5454). Or write: Data General, 4400 Computer Drive, MS C-228, Westboro, MA 01580.

Data General
a Generation ahead.

© 1986 Data General Corporation. TEO is a trademark and CEO is a registered trademark of Data General Corporation. Ethernet is a registered trademark of Xerox Corp.

NATURAL 2 performance draws another standard response.

For applications developers like Ken Little of Crawford & Company, a risk management corporation based in Atlanta, Software AG's NATURAL 2 is setting new standards in performance and productivity.

With functionality beyond COBOL or any other language, NATURAL 2 saves money by saving application development time. Its ease of use saves on education and training.

And the performance of NATURAL 2 is such that Crawford & Company is converting other 4GL systems into NATURAL 2 applications. Because they'll use less resources and cost less to run.

Discover NATURAL 2. The Next Dimension in 4th Generation technology.

For a free NATURAL 2 presentation diskette, call: 1-800-843-9534
(In Virginia or Canada, call 703-860-5050)

SOFTWARE AG
PROGRAMMING BUSINESS SUCCESS

SOFTWARE & SERVICES

SOFT TALK

Steven Pfrenzinger

There's good news and bad

The combination of a relational data base management system and a multitasking personal computer operating environment will make distributed computing a reality, changing the face of computing and potentially revolutionizing the market position of many enterprises. For those who like change in their life, this is good news. The bad news is that neither of these developments will reach fruition before 1990.

Does this mean we have to put our data base plans on hold for three years? That's what some enterprises seem to have decided. More commonly, information systems departments are making no explicit decisions, relying on vendor guidance, most particularly that from IBM.

The organization and manipulation of data is, or should be, the keystone in any organization's information systems. Similarly, each organization and its information systems are, or should be, differentiated from those of competitors. Hence, each enterprise should have its own tailor-made (distributed) data base strategy. Such a strategy would do the following:

- Have concrete, tested plans for exploiting DBMS technology as it becomes fully available.
- Profitably use each piece of the new technology as it appears.
- Ensure that today's information systems technology is put to full use.

How many DBMSs are still being used as access methods? In fact, how many data bases are really files? How many PCs with Irma boards communicate more than once a week? This is not a test, since no one knows the answers. The point is that even today's technology often has only a fraction of its potential exploited.

As so often happens at the richest banquets, we are still working on one course when

Continued on page 30

Expert system aids maintenance

Texaco's Progeval helps with modification of PL/I applications

BY CHARLES BABCOCK
CW STAFF

TORONTO — Texaco, Inc. has discovered it can automate some of its PL/I application maintenance tasks through the aid of an expert system, according to a Colorado State University associate professor.

The system, Progeval, was built based on analysis of a small fraction (about 50) of Texaco's PL/I applications selected for their capacity to provide examples of both good and bad programming, said Charles W. Butler, the Colorado State associate professor who helped design the system. Although it has not been put into broad-based use, Progeval continues to be developed and offers the potential of lending technical assistance to the maintenance of Texaco's PL/I programs, which make up half of the company's application library, Butler noted.

Butler, a soft-spoken academic who spends his summers working for Texaco, outlined the expert system to about 100 attendees at a recent Toronto gathering of the Software Maintenance Association. Rapid strides have been made in automating other areas of information systems, he said, but "software maintenance is still one of the most misunderstood concepts within the discipline."

Progeval was developed during a three-year period using a statistical base readily available to most mainframe shops, Butler said. The following subsystems collected data for what became the knowledge base of a backward-chaining expert system:

- An automated job-scheduling system for production applications, recording when and how often they were executed.
- The CPU usage charged back to the user per application.
- The computer operations manpower cost billed to the user.
- System complexity based on Thomas McCabe's metrics, which measure the number of GOTO and other nonvalidated constructs that tend to complicate a program.
- An automated manpower-scheduling system that contains proposed work on applications for the programming staff.
- An abnormal-ending tracking system that records staff response to system failure.
- Performance monitors that re-

Continued on page 28

DEC offers publishing software

BY NINAMARY BUBA MAGINNIS
CW STAFF

MERRIMACK, N.H. — VAX Document, integrated publishing software designed to cut time and expense in producing complex technical documentation, is being offered by Digital Equipment Corp.

Developed for the company's VAX/VMS environment, VAX Document helps produce technical manuals, engineering specifications, project and business plans and technical articles, according to DEC spokesmen.

The software package can create text, use standard markup language, integrate text and graphics, control revisions and format documents, according to the vendor.

The software is said to operate with any DEC standard terminal and outputs to any DEC line or laser printer, including the Printserver 40 and Scriptprinter networked with Adobe Systems, Inc. Postscript laser printers.

Continued on page 32

CCA data base reveals strategic add-on focus

BY CHARLES BABCOCK
CW STAFF

CAMBRIDGE, Mass. — When members of Computer Corp. of America's (CCA) users group convened in New Orleans last week, they were treated to a demonstration of the company's Model 204 on a specially installed IBM 9370.

The CCA data base management system running on IBM's low-end mainframe is a "load-and-go" version designed to run with VM/IS, the minimal operational-overhead version of the operating system.

CCA's Stewart

Moving its premier product quickly to the 9370 is part of an evolving strategy at CCA to offer the Model 204 as a strategic information system. Newly appointed CCA President Richard Stewart said he sees corporate executives using the Model 204 for information-retrieval purposes at sites that already have mainframe DBMSs. He said he is positioning the Model 204 as a DBMS used on top of the installed mainframe data base system, "targeting a strong share of the high end of the market."

"It's not that great in batch. It's much better on-line. It's much more flexible [than many DBMSs]," said CCA Vice-President of Marketing Jose Leruth, citing the Model 204's adaptability to departmental-level, executive information-retrieval pur-

Continued on page 26

Inside

- DEC enhances corporate videotex with All-In-1 integration. Page 26.
- Kisco announces new version of System/36 disk-management package. Page 34.
- MacKinney Systems develops Passport for VM operating system. Page 35.

Survey: 'Quick and dirty' fixes may work best

BY CHARLES BABCOCK
CW STAFF

TORONTO — A De Paul University researcher who surveyed 112 Fortune 500 firms found that advanced software development methods with careful documentation cost an organization more in system maintenance time than traditional methods.

Sasa Dekleva, assistant professor of information systems at De Paul in Chicago, said the results of the survey were too imprecise to draw conclusions on why advanced development techniques lead to greater maintenance efforts.

Dekleva speculated, however, that one reason for the greater maintenance efforts was that maintenance programmers spend more time reading the documentation of an advanced system before attempting to modify or fix it.

Maintenance time related to user understanding

Advanced development approaches with documentation lead to more hours spent on maintenance

	Advanced approach — users understand system	*Traditional approach — users do not understand system*
Average maintenance hours per month	348	55
Annual change requests	25	31
Implemented changes	21	10

INFORMATION SYSTEMS MANAGEMENT

In addition, users understand advanced systems better than spaghetti code and thus make more demands for system changes or additions, Dekleva surmised.

At the same time, he pointed out that some organizations may find it difficult to improve on the "quick and dirty" approach they have frequently used as the most efficient means of system maintenance.

Programmers who perform impromptu fixes without checking documentation may be just as effective as those who follow more structured approaches, Dekleva said.

Continued on page 28

DEC rolls out VAX manager

BY NINAMARY BUBA MAGINNIS
CW STAFF

MAYNARD, Mass. — Digital Equipment Corp. recently introduced VAX Software Project Manager (SPM), a package for planning, estimating and managing medium to large software development projects.

With SPM, development teams can update projects interactively and report their status on the same VAX computer they use to develop software, according to DEC spokesmen. Software developers can enter project data such as tasks to be performed, resources needed and deadlines. The VAX SPM application analyzes the information and prioritizes tasks, the spokesmen said.

Using its estimating capability, the software package determines the project's cost and duration. SPM's project-control mechanism helps measure programmers' progress against the plan, breaking out comparisons for the overall project and individual contributors, spokesmen claimed.

The VAX SPM also includes estimation tools that calculate project costs on the Cost Constructive Model developed by Barry Boehm, author of *Software Engineering Economics*. The package identifies crucial tasks with the critical path method and uses standard Gantt, Pert and precedence reporting tools, DEC said.

The software package employs both menu-driven graphical and traditional command-line interfaces, the vendor said. A graphics terminal or Vaxstation is required for all graphical functions, and the command-line mode can operate from any class of terminal, DEC said. Novice users can reportedly learn the application quickly by using the graphical interaction, and experienced users can opt for command-line mode for both batch and interactive processes.

The application is licensed from $2,250 to $71,250, depending on the VAX configuration, and can be ordered for August delivery.

Two ways to expand your VM System.

Ours.	Theirs.
Single System Image (SSI) from VM/CMS	VM Inter-System Facilities (ISF) from IBM
You can use any processors in Group 10, 20, 30, or 40 in an SSI complex	IBM's ISF does not support Group 10 and 20 processors. In Group 30, ISF only supports 4381's with 16 megabytes or more, and 3083's. In Group 40, ISF does not support the 3081 D16 processor
You can use IUCV and VMCF to communicate between programs across processor boundaries in an SSI complex.	With IBM's ISF, you can't use IUCV and VMCF across processor boundaries
An SSI complex supports up to 33 processors	IBM's ISF is limited to two CPUs
SSI dynamically switches virtual machines from one processor to another to satisfy user requirements. This means a user's terminal and virtual machine can be on different CPUs. As a result, duplicate software licensing and maintenance charges can be reduced or eliminated	IBM's ISF offers no switching capability.
You can use any version of VM/SP or VM/HPO in an SSI complex	IBM's ISF requires that you use HPO 4.2
SSI balances the user load automatically.	IBM's ISF doesn't do load balancing.
SSI supports FBA and Count/Key/Data devices	IBM's ISF inter-system link and spool facilities do not support FBA devices
SSI doesn't require extended storage support	IBM's ISF does
SSI has been in production since 1980. It's available *today!*	IBM's ISF *planned availability* isn't until August 1987

SSI allows multiple VM-based CPUs to communicate with each other in order to present a single system image to the users. SSI is the only current alternative to CPU upgrades that can keep user communities whole when the exhaustion of resources fragments those users onto multiple CPUs.

An SSI complex offers the reliability and availability of multiple-processor configurations together with the convenience of a single processor.

To explore our way, call or write Charles Aronovici at VM/CMS Unlimited. He'll be happy to tell you about SSI and our other system-expanding products.

Single System Image (SSI)
from
VM/CMS Unlimited, Inc.
161 Granite Avenue, Boston, MA 02124
617 288 4434 800 443 4317

VM/CMS
Expanding the vision of VM

CCA data base

CONTINUED FROM PAGE 25

poses. CCA's Model 204, in simplistic terms, is "field-driven," Leruth said.

When major oil companies increased the price of a gallon of gasoline to more than $1, the price change resulted in a simple addition to the price field in the Model 204, while other DBMS users had to redesign that data element, Leruth said.

The DBMS also offers features frequently not found elsewhere. It can use variable-length records, allowing data base designers to store text as well as alphanumeric data of preset length. The fourth-generation user language and I/O controls are embedded in the DBMS's nucleus, freeing them from being called by the operating system.

It is not surprising that the new management of CCA, installed by parent Crowntek, Inc., has outlined a niche for the Model 204, since it has always been a niche player. The original Model 204 was designed for use by the Central Intelligence Agency; other defense agencies adopted it, and, consequently, the Model 204 often has been referred to as a federal government DBMS.

CCA officials said their DBMS has outgrown that reputation and that 75% of its users are now commercial customers.

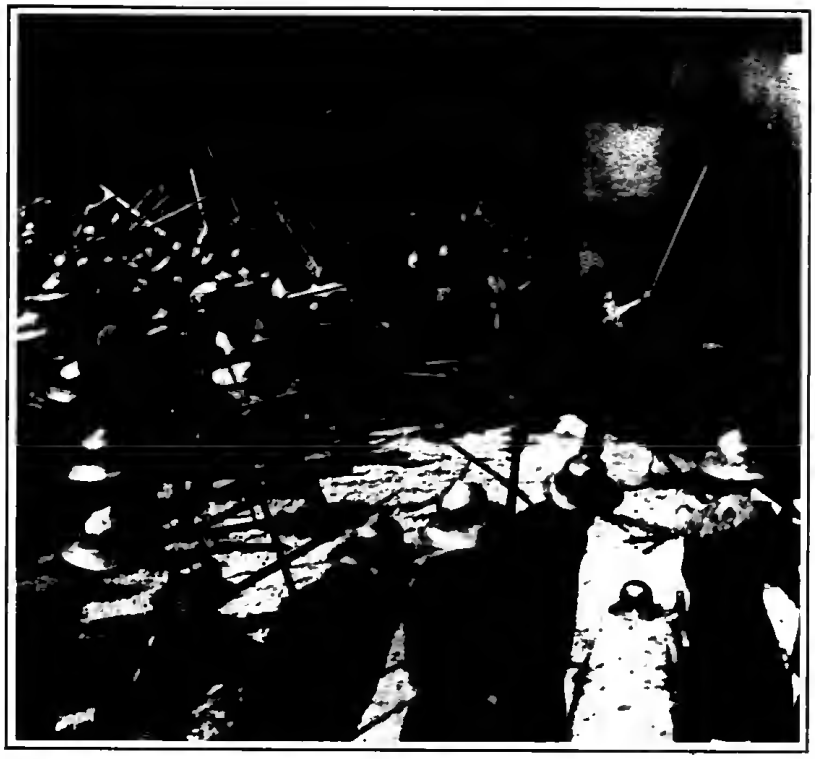
CCA's Leruth

CCA President Stewart said he anticipates IBM will sell 9370s at a brisk rate and that with the Model 204 semi-independent from the operating system, the DBMS will be able to support 20 to 25 users on the hardware in a high-performance environment. Stewart claimed the Model 204 running on a 9370 would be able to support as many as 150 transactions per second. The firm is going to conduct a standard Tandem Computers, Inc. ET1 benchmark of the Model 204 on the 9370 to test that claim, he added.

The 9370-geared release of the Model 204, Version 10.0, is set to be generally available in the first quarter of next year.

CCA said it is committed to deliver an SQL interface to the Model 204 within the next 12 months. The SQL queries would be translated into User language queries by the interface for accessing the data in the Model 204, company officials said. The Model 204 can provide external data views in the same manner as a relational DBMS, but CCA officials said the User language provides the most efficient means of accessing data.

In addition, CCA, a pioneer in the field of distributed data bases, anticipates a distributed version of the Model 204 with recovery capability within two years, Leruth said.



Not every DP manager uses FOCUS.

It's easy to recognize the ones who don't. They're surrounded by impatient users.

FOCUS delivers major productivity gains fast by helping you develop the applications your users need.

FOCUS is the ultimate in fourth-generation technology. A complete and powerful language. A flexible database manager with relational facilities. And a state-of-the-art, full-featured decision support system.

It has the functional completeness demanded by professional programmers. A recent study found that over 40 percent of all mainframe FOCUS usage is in production applications.

Yet FOCUS also offers a point-and-pick windowed interface which allows end users to create their own applications—without learning the language.

FOCUS Fits Right In

FOCUS has interfaces to every important database manager on the market. You can build a new system in FOCUS that runs directly against existing files. Create separate FOCUS files. Or both.

And for Information Center use, these same interfaces enable FOCUS to serve as a friendly front end to any file on your mainframe.

FOCUS runs in IBM's 370, PC and PS environments, on the DEC VAX, under Wang VS, and under UNIX. Your programmers can write a FOCUS application on the most convenient machine—say, an IBM PC—and port it to any of the other environments.

76 of Top 100

Of the 100 largest U.S. corporations, 76 use FOCUS. In fact, existing customers buy more new copies of FOCUS than anyone else.

Thousands of FOCUS applications run in all of these categories

- Financial and Accounting
- Tracking Systems (e.g. Inventory, Assets, Equipment)
- Marketing and Sales
- Personnel and Payroll
- Strategic Planning and Analysis
- Research Studies and Surveys
- Order Entry
- Production Control

FOCUS has a large and independent user group. And Information Builders backs FOCUS with the support you'd expect from an industry leader: local help lines in 12 regional offices, a central hotline, and a national network of technical support and training centers.

Don't wait until your back is to the wall. Get more information on FOCUS. Call 1-212-736-4433, Ext. 3700. Or write Information Builders, Inc., Dept. A1, 1250 Broadway, New York, NY 10001. Our literature gets right to the point.

FOCUS
Information Builders, Inc.

'Quick and dirty'

CONTINUED FROM PAGE 25

The tentative conclusion drew some exclamations of surprise from attendees at the meeting of the Software Maintenance Association, which was held here recently

For several years, experts have debated the best approach to software maintenance, usually concluding that more sophisticated development approaches — such as structured software engineering, data base-oriented information engineering and prototyping — would yield maintenance dividends. Dekleva's survey yielded few results that supported that conclusion.

In comparing the time spent maintaining systems, Dekleva found "no significant difference" in time spent on software developed using advanced approaches vs. traditional approaches. "This was certainly unexpected," he told association members.

Time spent on recovery-type maintenance activities was lower with advanced systems, but other maintenance activity was higher

Understand advanced methods

Users tend to better understand systems developed with advanced methods, such as prototyping, and therefore make change requests that are more likely to be implemented, according to Dekleva's figures.

Twenty-one of 25 requests were implemented with systems understood by the users in the survey, compared with 10 of 31 requests by users who did not understand their systems.

At the same time, maintenance time was higher on the systems that had achieved a degree of user understanding; 348 hours per month vs. 55 hours per month.

The survey did not attempt to define how dependent the organizations were on the advanced vs. traditional systems or the complexity of their current role, Dekleva said.

Dekleva noted that "keeping the documentation up to date takes additional time, while a quick and dirty fix may be that much faster."

Expert system

CONTINUED FROM PAGE 25

cord hardware usage during system execution.

The data collected by these subsystems became the source of information Progeval evaluated and reduced to 17 variables. The variables included vital statistics such as number of emergency fixes, number of requested changes, amount of CPU and TSO teleprocessing monitor usage required and perceived difficulty of maintaining the system.

Butler credited James Elshoff of General Motors Corp. for providing another source of vital statistics, through GM's Peek program, which scans PL/I programs and provides a complexity reading on them.

"Program complexity correlated extraordinarily highly to system failure," Butler recounted.

LISP-to-mainframe woes

Another unsurprising correlation was found between an application's manpower needs and the number of emergency fixes it required, he said. As Butler began developing rules for the expert system, he said he found it difficult to tie the mainframe data collected to the knowledge base. "All of the information was nice, but we couldn't implement it," he explained. "We were unable to link a LISP machine to a mainframe and get the data."

A Texaco staff member built an expert system shell, Texpert, that ran on a mainframe to get around this roadblock. The prototype of Progeval was built with Texpert, using an IBM ISPF-type user interface with hierarchical menus, data entry screens and information messages. In addition, a batch component of the system gathered data from the subsystems and loaded it into ISPF tables.

The batch procedures were key to the operation of the system, Butler said. "Assimilation of expertise — both facts and relationships among facts — is a costly, exhaustive task," he said. The subsystems automated the collection of data, and Progeval's batch process provided an automatic means of evaluating it.

With that background support, a user can consult Progeval, examining particular applications. It is still left up to the user to assign a level of confidence required to the application he is examining. The expert system then applies the rules of how well it should be written and perform vs. the knowledge of how well it has run in the past.

The system can highlight trouble areas, prescribe corrective measures and even offer a rough judgment on when an application's problems and costs are outstripping its ability to perform, leading to a recommendation that it be rewritten.

Butler said one of the main advantages of the expert system is simply its ability to avoid the bias of the maintenance staff. "Often, verbal feedback on an application was disproven by the numbers. . . . Systems managers get attached to their code" and do not see how much they are investing in maintenance, he added

Another source of misleading feedback came from new managers attempting to enlarge their domains with additional programmers by discovering problems invisible to their predecessors.

"We attempted to move that evaluation away from the staff. We wanted to remove that subjectivity," Butler noted.

VIDEO-BASED TRAINING

For Your Free Demonstration Package, or courseware catalog, call:
(800) 323-8649
or
(312) 987-4084

COMPUTER TECHNOLOGY GROUP
Telemedia, Inc.
310 S. Michigan Ave
Chicago, IL 60604

UNIX*/XENIX**& 'C'
UNIX Executive Perspective
UNIX Overview
UNIX Fundamentals for Programmers
UNIX Shell
'C' Language Programming
vi Editor
Using Multiplan

DEC
VAX/VMS for Programmers
VAX/VMS for Users

Ada

PC
PC Primer
MS-DOS
Lotus 1-2-3
dBase III
dBase III Plus
Multimate
Multiplan
Symphony
Displaywrite

System/38
Introduction to S/38
Workstation Operator Training
Application Development Fundamentals
Query for Users
Text Management for Users

*UNIX is a registered trademark of AT&T
**XENIX is a trademark of Microsoft

Using the wrong 4GL to write a production system has its risks.

Not every 4GL can handle a big production system. FOCUS can.

It has the completeness you need to create complex multi-user systems. It handles very large databases—some FOCUS applications use files of over a million records. And FOCUS offers flexible design options to optimize database operation and improve efficiency.

Your Database or Ours

FOCUS has its own integrated database manager. And it also has interfaces to every important database system on the market. So you can run your large applications against existing files. Or use the powerful FOCUS database manager. Or both.

Environmentally Sound

FOCUS works in all of these environments:

MVS/TSO	VAX/VMS	UNIX
VM/CMS	MS/DOS	IMS/DC
ETSO	Wang VS	CICS

With the automatic system generation facilities of FOCUS, you can use a point-and-pick windowed interface to quickly design databases and create applications. Moreover, there's a full set of programmer tools, including a screen painter.

In fact, you can program so rapidly in FOCUS that you can easily create and test many prototypes of a large production application.

If your database requires SQL, all the complexities of embedding SQL commands in COBOL are eliminated. FOCUS generates the required SQL commands automatically.

Our First 300,000

Over 300,000 users have boosted their productivity by making FOCUS the most popular fourth-generation language in the world.

FOCUS runs in IBM's 370, PC and PS environments, on the DEC VAX, under Wang VS, and under UNIX. Your programmers can write an application using the windowing capabilities of PC/FOCUS,® and deliver window-driven applications that will run wherever FOCUS is installed.

FOCUS has a large and independent user group. And Information Builders backs FOCUS with local help lines in 12 regional offices, a central hotline, and a national network of technical support and training centers.

Why run risks? Get more information on FOCUS. Call 1-212-736-4433, Ext. 3700. Or write Information Builders, Inc., Dept. A2, 1250 Broadway, New York, NY 10001. Without sticking your neck out.

PC/FOCUS is a registered trademark of Information Builders, Inc.

FOCUS
Information Builders, Inc.

Good news . . .

CONTINUED FROM PAGE 25

the next one is served. In this case, DB2 is the next course; IMS and other established DBMSs are not being acquired at their former rate. In some quarters, they appear passe — in spite of the fact that this is well-understood software with individual firms having invested hundreds or thousands of staff-years to develop applications and master the technology.

The odd part is that DB2 and its ilk may be stars, but talk to those who have had DB2 for a while and you find that actual use is still largely experimental. Not that this is wrong; IBM was correctly cautious in initially pushing DB2 as a high-class report writer. This got people into things, but not over their heads.

But a dangerous vacuum may be forming as we wait for the magic tools — after all, relational technology is only a tool. Other, older tools can often do new tricks if there is sufficient skill, prompted by a large-enough need. I have experience here, having been part of a team that designed and implemented crude but effective artificial intelligence applications built on IMS, PL/I and Cobol.

So the first step is to carefully examine the here and now to see if it is good enough to give a business a three-year head start on the competition, who may be sitting things out, waiting for the "right" tools.

Of course, older technology isn't right for everything, otherwise we would still be using machine language. Let's take DB2 as the best-known example of a new software technology being delivered incrementally; incremental in the sense that DB2 is partway along in the following areas:

- Being fully relational (if you accept Edgar F. Codd's "grading" system).
- Development and support tools (an active data dictionary still to come).
- Our understanding of how it can be used.

This last point is the least discussed but may be the most important. DB2 was first presented as a sort of front end to IMS; now it is presented, and largely accepted, as a full-fledged production DBMS already suitable for applications.

But which applications?

Order-entry applications are on most people's lists because of application characteristics such as dynamic data; well-understood application functions; being a somewhat self-contained application area; and the need for many ad hoc reports for sales and marketing.

But how many critical and unique business problems are there when people say, "Finally, DB2. Now we can get down to work." Technology and tools, even in an intermediate form, may be getting ahead of us again.

The same thing might be said, albeit more strongly, concerning a new operating system for the Intel Corp. 80386 chip. This operating system will have multitasking for the PC, almost certainly possess well-developed hooks into LU6.2 for host connections and, perhaps, some kind of host data base interface.

But if the world were full of well-defined business needs that simply had to have a next-generation micro operating system, then Digital Research, Inc.'s Concurrent DOS, available for several years, would have swept the board. The problem is that few PC users understand multitasking to mean much more than not having to wait so long for something to happen on the screen. And few information systems departments have been able to use PCs as more than terminal replacements; many still see PCs as primarily an irritant.

So people try DB2 and begin to use it; some, I'm afraid, only to keep up with the Computer Joneses. There is a problem and a temptation in such incremental use. Since DB2, for example, is a moving target, the tendency is to wait and see before using it seriously. This tendency is aided and abetted by many of the data base technical folk, who are as much interested in learning as doing.

Planning

In a way, we're lucky that relational DBMS technology and the next generation of PC operating systems are not with us yet. In a sense, we have been given a grace period to prepare ourselves for the next wave. The unfortunate thing is that so few enterprises seem to be getting ready to take advantage of the new technology when it does arrive.

There is little question that planning should be going forward. The potential gains are significant, including having much better access to information, more flexible systems and the opportunity to bind enterprises together using information and technology.

This sounds good, maybe too good. Why not sit tight and let someone else pioneer? But most firms can't passively wait. The problem is that the following risks to using the new technology are at least as big as the benefits:

- Much higher costs, if not handled correctly.
- Potentially enormous problems with security and control.
- Many opportunities to build utterly inadequate systems.

The problem is that while a fair number of people have conceptual ideas on how distributed data bases might be used, hardly anyone knows how well they might work. No wonder IBM has been putting our feet into this particular tool so gradually.

The first step for every information systems organization is to keep informed

Continued on page 32

The problem with most 4GLs is they're finished before you are.

And where does that leave you?

With the final, tricky ten percent of your application yet to write, and no 4GL left to write it with. Sound familiar?

If so, try INFORMIX®-4GL.

Never again will you have to switch to C or COBOL to truly customize your application. Instead, INFORMIX-4GL provides an all-encompassing syntax for every aspect of your application building.

So once you're programming in INFORMIX-4GL, you never have to leave it. And considering all it can do, you may never want to.

Now, for instance, you can write in just ten to twenty pages of 4GL code, applications that would take hundreds of pages with C.

That's because INFORMIX-4GL was designed from the start to be an application building language. It's built around the full implementation of ANSI Standard SQL. And features Custom Screen Generation, Custom Menu Building, a built-in Report Writer and Windows.

What's more, INFORMIX-4GL works with UNIX,™ MS™-DOS and Networked DOS operating systems. And, of course, it's compatible with INFORMIX-SQL—our popular proven DBMS. So files you build with one, you can access with the other.

For more information and our free booklet, "A 20-Minute Guide to INFORMIX-4GL," call 415-322-4100.

Or write Informix Software, 4100 Bohannon Drive, Menlo Park, CA 94025.

And start taking your applications to even greater heights.

INFORMIX

The RDBMS for people who know better™

With some 4GLs, training users can be a real challenge.

With FOCUS, users can have real success. Fast.

FOCUS is the ultimate in fourth-generation technology. It is designed to let users do useful work immediately.

For example, there is a window-driven point-and-pick interface that lets beginners generate a report or graph, make inquiries—even create an entire application—without learning any syntax. In fact, the system displays the syntax so the user can learn the language while creating the application.

Lots of Help for Users

Your programmers can create extremely easy-to-use, window-driven applications using FOCUS. Or casual users can help themselves to information through the English Query Language (EQL)—the self-explaining natural-language interface to PC/FOCUS.®

For anyone who wants to learn the FOCUS fourth-generation language, complete, professionally developed learning resources are available. Just take a look at the box to the right.

Other Environments

FOCUS runs in IBM's 370, PC and PS environments, on the DEC VAX, under Wang VS, and under UNIX. Learn FOCUS in any one of these environments and you can write an application in any other, and it will run in all of them.

Most Widely Used

Around the globe, more than 4000 sites have FOCUS installed, making it the most widely used fourth-generation language in the world. And we've been involved in training at every site.

FOCUS has a large and independent user group. And Information Builders backs FOCUS with the support you'd expect from an industry leader: local help lines in 12 regional offices, a central hotline, and a national network of technical support and training centers.

FOCUS Education

- Over 200 certified staff trainers
- Scheduled classroom education at 40 North American centers
- Customer-site training
- Courses and training materials customized to environment and application
- Computer-based training materials for the PC or mainframe at current release levels
- Self-study primers
- A Train-The-Trainer program

If you want your users to be pussycats, get more information on FOCUS. Call 1-212-736-4433, Ext. 3700. Or write Information Builders, Inc., Dept. A4, 1250 Broadway, New York, NY 10001. We'll send you something meaty.

PC FOCUS is a registered trademark of Information Builders, Inc.

FOCUS
Information Builders, Inc.

Good news . . .

CONTINUED FROM PAGE 30

about the technology, although even this will not be as easy as it looks. If it were not for IBM's relative openness on these topics, there would be precious little readily available.

But keeping informed goes beyond peering into the technology window. Information systems departments must examine what type of information-based initiatives others in their industry are attempting. This means keeping track of industry movements in an organized, analytical way; current efforts in this area tend to be episodic and anecdotal, when they exist at all.

Then the hard part begins. How should the enterprises respond? What initiatives of its own are possible? Information systems executives may then find themselves in the unfamiliar, but congenial, role of working with, for example, the marketing department to answer these kinds of questions.

Experiments in the technology should be started, continued and accelerated. It's not just that hands-on experience is the most valuable asset, but that each organization will have to satisfy its own combination of business needs in a particular technical environment.

As experimentation continues, information systems management can begin to turn a critical eye to current applications. What are their defects — both in a technical sense as well as from the standpoint of meeting business needs? How much would the use of new technology improve matters? Is it feasible to modify old systems or is a fresh start necessary?

After information systems has started to become comfortable with what the new technology actually means to them, information systems management can approach customer departments more confidently and with heightened concreteness. This cautious approach is especially important for information systems departments who have had credibility problems with key users.

I have found in my work that user departments are often on one extreme or the other. Believing either everything, or nothing, is possible when using technology. Shaking users out of their preconceived positions is one of the hardest parts of getting information systems and other business units to plan together. A few years ago, many of us thought that the widespread use of PCs would make it easier to talk to non-information systems business units. In many cases, however, PCs have just introduced another layer of preconceptions, such as "Why does it take you six weeks to do what it takes me two days on my PC?"

Although relatively straightforward, this analysis may seem hard to put into practice in these days of mergers, overhead reduction and short-term goals. Fortunately, the quality of the planning effort is probably more important than quantity. There may not even be a need for full-time people being assigned to it; in fact, there are good arguments against cutting people off from the rest of the organization. A larger problem will be to find the people who have an aptitude for dealing with technology and business

Pirenzinger is president of IMS Consulting Inc., an Encino, Calif.-based firm specializing in IBM's IMS DB/DC and CICS/DL/I.

DEC software

CONTINUED FROM PAGE 25

VAX Document integrates with VMS software development tools so that programmers can create documentation with the same tools they use to develop software, DEC said.

A programmer, for example, can use the VMS Language Sensitive Editor to create text, DEC's Code Management System to maintain documentation files and VAX Document to format information, the vendor said.

DEC claimed the VAX Document markup language allows users to focus on content rather than formatting.

Using any VMS editor, users reportedly can create files, enter text and insert markup instructions that identify each text element, such as subhead, list or paragraph of body copy.

Functional features

The software package automatically formats documents according to markup instructions and provides full hyphenation, justification, pagination, placement of headers, footers and footnotes and page numbering, the vendor said.

DEC's Decnet networking software allows central work groups to create documents using contributions from departments across an organization. Formatted text can be interchanged among all VAX Document-based systems.

A large, multiauthored project in which several writers work on different chapters of a single book can use VAX Document's bookbuilding facility to merge chapters, automatically number sections, create a table of contents, verify cross-references and create an index, DEC noted.

The software merges any Postscript-compatible graphics files and graphics produced with Decgraph or Decslide into text files being formatted for laser printer output, the vendor said. Documentation groups can then eliminate manual paste-up.

The package is priced from $1,350 on the Vaxstation 2000 to $32,400 on the VAX 8800.

DEC said the software package is scheduled to ship in 60 days.

MORE INFORMATION MORE CONNECTIVITY MORE RESOURCES

NEW PRODUCTS

Systems software

BBN Software Products Corp. has announced **Dataprobe,** an interactive time-series analysis and graphics system.

Dataprobe is said to provide users with direct shareable access to gigabytes of source data. It contains its own structured command language that allows users to create automated procedures for producing routine quick-look reports. The system can be used to analyze recorded data from sources such as telemetry and recording systems; wind tunnel tests; computer simulations; atmospheric testing and biological and physiological recordings.

The Dataprobe system runs on Digital Equipment Corp.'s VAX computers under the VMS operating system. Prices range from $30,000 to $65,000.

BBN Software, 10 Fawcett St., Cambridge, Mass. 02238.

Manufacturing Decision Support Systems, Inc. (MDSS) has enhanced its **MDSS** manufacturing planning software to allow organizations to run multiple companies from a single copy of the software.

According to the vendor, each division or company can configure MDSS to its specific needs while using the same source code. Each entity can be locked out of the other's data, but data can also be available to all divisions.

The software has also been enhanced to include a training data base which can be used during installation of the software and for testing operating procedures and new modules. MDSS costs from $36,400 to $84,000 It runs on Hewlett-Packard Co. 3000 systems.

MDSS, 300 E. Ohio Building, 1717 E. 9th St., Cleveland, Ohio 44114.

Westmoreland Software International, Inc. has released **Version 7.1** of its **Application Design and Development** (Add) system for the IBM System/34 and 36.

The Add System is said to generate RPG source code and documentation for reports, on-line inquiries, file maintenance programs, batch programs and bar graphs Version 7 1 includes a report writer language for nonprogrammers, the ability to preserve modification to RPG source code, access to screen attributes for fields, the ability to enter compile-time arrays, the ability to copy programs from one CPU to another, the ability to handle alternative index files with incontiguous keys and enhanced manuals

The Add System is priced at $3,850.

Westmoreland Software International, Suite 195, 853 E Semoran Blvd , Casselberry, Fla. 32707.

Signal Technology, Inc. has announced **Version 6.0** of its **Interactive Laboratory System** (ILS) for the Digital Equipment Corp. Microvax, Vaxstation 2000 and local-area Vaxcluster products.

ILS was designed for scientific and engineering applications that require analysis of time-series data using digital signal processing techniques. ILS operations include frequency analysis, digital filtering, numerical analysis, data manipulation and speech processing. It supports data acquisition functions for the Vaxlab real-time Scientific Workstation. Version 6.0 provides windowing features and includes a simplified menu system.

Prices range from $5,100 to $12,500.

Signal Technology, 5951 Encina Road, Goleta, Calif. 93117.

Applications packages

Biodesign, Inc. has introduced **Biograf/GKS**, a molecular-modeling software package said to run on Digital Equipment Corp.'s VAX computers.

Biograf/GKS is a computer-aided molecular design package. It features the ability to simulate both small and large-scale molecules and the ability to integrate molecular mechanics with computer graphics, allowing users to analyze problems interactively rather than remotely.

Other features include molecule-fragment libraries for building larger molecules and force fields such as MM2, Amber and Charmm, which are recognized mathematical formulations used to express the forces between atoms.

Biograf/GKS is priced from $34,950 to $95,000.

Biodesign, Suite 615, 199 S Los Robles Ave., Pasadena, Calif 91101.

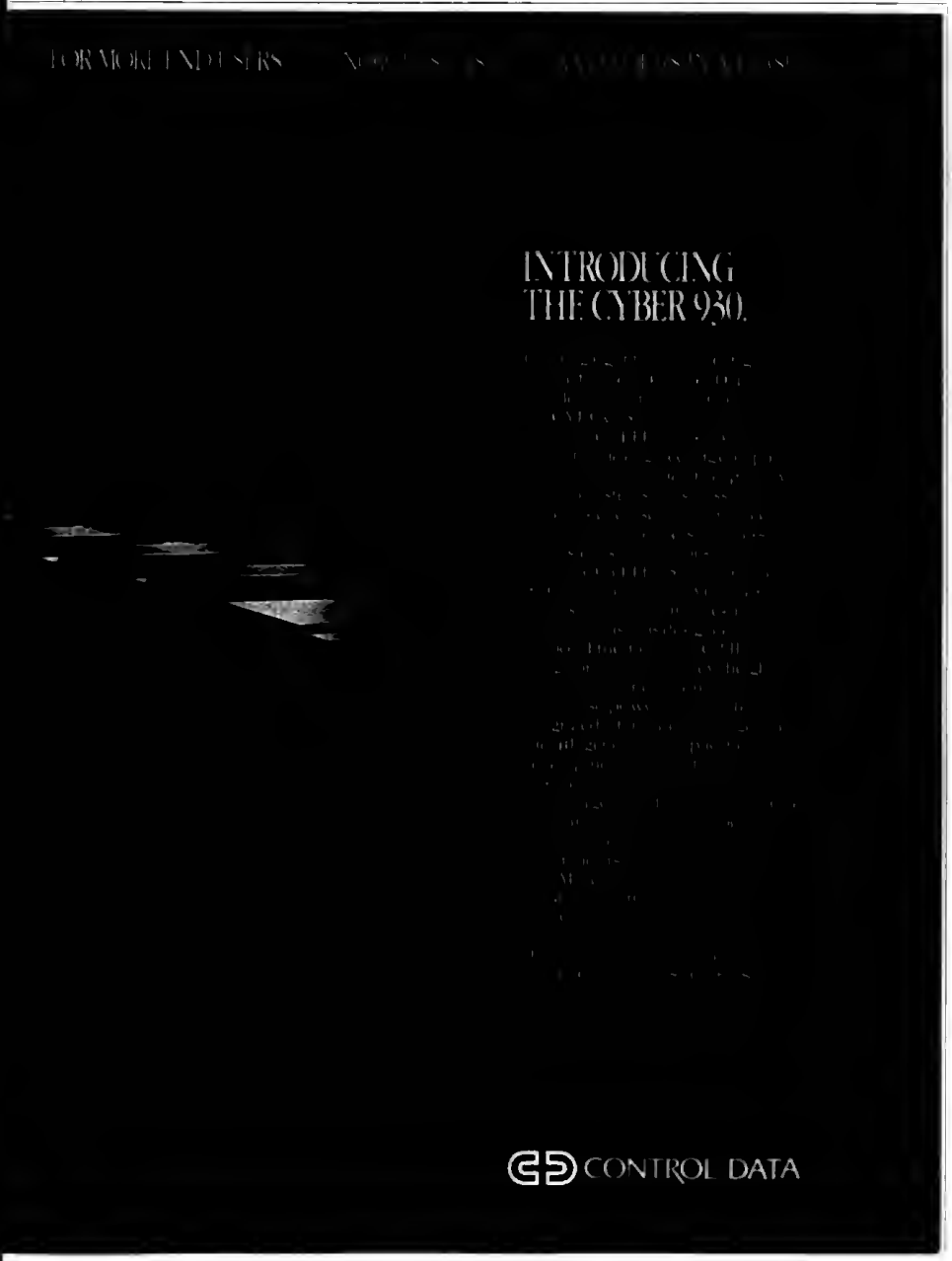
Cadam, Inc. has announced **Professional Cadam Release 1.2.**

Professional Cadam is a computer-augmented design system that operates on a stand-alone general purpose computer workstation. It utilizes an IBM 5081 display and a 5085 controller, but also supports a native display hardware configuration that does not require the 5085 controller.

Release 1.2 offers drawing functions including hatch and fill of dittos and symbols, support for the IBM floating-point card and the RT processors, an interface to Interleal, Inc.'s RT Publishing Software System and plotting support for both pen and electrostatic plotters

Professional Cadam is priced at $10,000.

Cadam, 1935 N Buena Vista St Burbank, Calif. 91504



Languages

Interactive Software Engineering, Inc. has announced the **Eiffel** compiler and programming environment.

Eiffel is a language and set of tools said to use an object-oriented programming methodology. The language offers classes with multiple inheritance, generic parameters in the Ada style and information hiding for the construction of large systems.

It reportedly includes an original mechanism for expressing assertions and invariants and is statically typed for added security.

Eiffel is available on all versions of AT&T's Unix operating system. Pricing starts at $1,995.

Interactive Software Engineering, Suite 7, 270 Storke Road, Goleta, Calif. 93117.

Utilities

Kisco Information Systems has introduced **F1 Manager Level 2**, an enhanced version of its IBM System/36 disk-management package.

Level 2 of the software includes a disk backup facility said to be a functional replacement for SSP Computer Services, Inc.'s Save All. It allows users to create master backups with true incremental backups between masters. Level 2 also features the ability to back up files, libraries and folders in groups.

F1 Manager Level 2 costs $250. Registered users will receive the upgrade free.

Kisco Information Systems, Suite 5-G, 120 Beverly St., Mt. Kisco, N.Y. 10549.

Microtec Research, Inc. has announced **Xray68K**, an integrated high-level/assembly-level debugger for the Motorola, Inc. 68000 series of microprocessors.

The Xray68K is said to be capable of debugging programs created by Microtec's 68000/10/20 C compiler and assembler. According to the vendor, it allows the use of multiple execution environments. It employs a window-oriented user interface and allows users to customize screens and viewpoints.

Other features include the ability to use command files, output logging, simulated I/O and interrupts, single-step execution and on-line Help.

Xray68K is priced from $3,500.

Microtec Research, 3930 Freedom Circle, Santa Clara, Calif. 95054.

Updata Software Co. has announced **Version 1.0D** of its IBM DB2 productivity tool, **DB/Proedit**.

DB/Proedit provides access to DB2 tables using an ISPF editor-command format. Version 1.0D provides the ability to specify the maximum number of rows to be displayed in a table. It allow users to automatically commit after every UPDATE, INSERT or DELETE.

Other features include a command to control the translation of alphabetic characters to upper or lower case and the ability to display the status of some commands.

Version 1.0D of DB/Proedit costs $4,500 per year.

Updata Software, 960 Holmdel Road, Holmdel, N.J. 07733.

Woven Software has announced **Version 2** of its **SMFutil**, a general-purpose SMF data movement utility.

Version 2 is said to incorporate the ability to dump SMF data directly from the MVS operating system's Manx files and clear the Manx files. It accepts input from sequential and VSAM sources and can place data to sequential- or VSAM-target data sets.

Other features include the ability to limit the data selected to that required by the user, built-in error detection and recovery capabilities and the ability to extract SMF data from damaged or incomplete data sets without abending.

SMFutil Version 2 is priced at $6,000 for a permanent-site license for the first processor.

Woven Software, 7202 Holder Forest Circle, Houston, Texas 77088.

Apogee has announced **Morehelp**, a general-purpose utility for Hewlett-Packard Co. HP 3000 computers.

Morehelp is said to provide information on HP 3000 system intrinsics, including parameters and options; image data bases and intrinsics; query; Vplus, including intrinsics; scientific, mathematical and compiler libraries; sort/merge; Fcopy; debug; file formats; character codes; and system management.

Morehelp is available on 1600 bit/in. magnetic tape, in manual format and on microfiche. Magnetic tape copies are priced from $195 to $295.

Apogee, 4632 W. Frankfort Drive, Rockville, Md. 20853.

P.E.R. Software, Inc. has enhanced its purge and merge **unduplication software subsystem** for its Mailing List Management System for the IBM System/36 computer.

The subsystem is said to provide a means of eliminating duplicates from name and address lists. Lists can be unduplicated based on name and address or based on address only. The new version includes the ability to specify that the newest or oldest records in a set of duplicates be removed. The user may also specify a primary list, which should contain the retained records of duplicate sets.

The unduplication subsystem is priced at $500.

P.E.R., 38109 87th St., Burlington, Wis. 53105

Keep your mainframe in touch: Send your remote PCs a card!

If a telephone line goes to wherever your remote PCs are, Sync-Up™ from UDS can now link them directly to your mainframe!

Sync-Up fits a complete synchronous modem and a protocol converter onto a single card; no other modules are required. Add appropriate UDS-supplied software, and you'll have a fast, reliable micro-to-mainframe link. If your system is already supporting 201C, 212A, 208A/B and/or 9600B modems, no modifications are required at the mainframe end.

Sync-Up boards may be specified with software to support 2780/3780 or 3270 BSC, and 3270, 3770 or 5251 SNA or a variety of other protocols. For complete technical date and quantity prices, contact Universal Data Systems, 5000 Bradford Dr., Huntsville, AL 35805. Telephone 205/721-8000; Telex 752602 UDS HTV.

Universal Data Systems

MOTOROLA INC.
Information Systems Group

Created by Dayner/Hall Inc., Winter Park, Florida

MacKinney Systems has announced **Passport**, a program for the VM operating system.

Passport is said to allow a user the option to log on to multiple logical-CMS terminal sessions and connect to multiple-guest virtual operating systems simultaneously. Users may dynamically create or drop up to 12 logical-terminal sessions from one IBM 3278-compatible terminal. Logical-terminal sessions are associates with user-defined keys.

Passport runs on IBM operating systems running under VSM. It costs $1,495 or $595 per year.

MacKinney Systems, 2674-A S. Glenstone, Springfield, Mo. 65804.

Data base management systems

Release K of the **Basis** text information management system has been issued by **Information Dimeosions, Inc.**

Release K is said to provide users with an interface to the Basis system, which includes multiple data base access capabilities. According to the vendor, Basis's Host Language Interface allows entrance to data base files from application programs written in the installation's host language. The language interface features 27 layered routines, permitting simultaneous processing on up to 999 data bases, with full data base security functions.

Other features include the ability to extract new document sets from previously retrieved sets, a data loading parameter, scrolling commands and a reentrant Basis version for IBM VM/VMS machines.

First-copy license costs for Basis's central system module start at $15,200.

Information Dimensions, 655 Metro Place S., Dublin, Ohio 43017.

Training saftware

Innovative Software Solutions, Inc. has added a module to its **Teach Me/3000** series of computer-based training modules for the Hewlett-Packard Co. HP 3000.

The module, using turbo image intrinsics, was designed for users of the HP 3000 who are using HP's Image and Turboimage data base management system software. The module uses examples in Cobol to illustrate methods of accessing the Image and Turboimage subroutines from within application programs. The intrinsic subroutines are grouped by function to be performed, and topics are directly accessible through keyboard commands.

The module is priced at $750 and is accompanied by the Teach Me drive program and an on-line tutorial module.

Innovative Software Solutions, 10705 Colton St., Fairfax, Va. 22032.

Services

Software Automation Corp. has introduced a **2200-to-VS conversion service** for converting Wang Laboratories, Inc. Wang 2200 applications to VS Basic.

The service allows users of 2200 applications written in Basic-2 to move the VS without abandoning existing programming investments. According to the vendor, percentage of conversion is as high as 85%, depending on the complexity of the program. The vendor has also announced the ability to transport consecutive and indexed 2200 files to VS data files. The service is priced from $10 to $45 per program, depending on the number of programs.

Software Automation, 2131 White, Houston, Texas 77007.

Develapment tools

Phase Linear Systems, Inc. has announced **The Exec Productivity System** (EPS) for users of MVC Corp. Rexx and Exec 2 under the IBM VM/CMS operating system.

EPS is a collection of integrated tools providing protection, security and function integration for programs written in Rexx or Exec 2. It is said to encode Exec programs and convert them to CMS modules so that source logic and other sensitive information, such as passwords and user IDs, are not accessible to users. EPS is priced at $3,500.

Phase Linear Systems, 1850 K St N.W., Washington, D.C. 20006.

Uniq Digital Technologies, Inc. has announced **Decport**, Unix System V, Release 3 in source form for Digital Equipment Corp. VAX processors.

Decport is said to be a direct port from AT&T's Unix System V, Release 3 for the VAX. It includes all the development, in source form, performed by Uniq since its initial port of System III in 1979.

Source fees for Decport are $25,000.

Uniq, 28 S. Water St., Batavia, Ill. 60510.

Genesis V, an expert software system said to allow users to design IBM System/38 applications using artificial intelligence techniques, has been announced by **Help/38 Systems**.

Genesis V allows users to add their own lines of code to the generated RPG III source. Genesis V is said to learn those lines of code and put them in the correct logical place when the source is regenerated. Genesis V also allows users to write to their own standards for system design and system operation. The system includes a programming knowledge base and an interactive specification data base. Genesis V costs $14,950 per CPU.

Help/38, 210 Baser Technology Plaza, 6101 Baser Road, Minnetonka, Minn. 55345.

Trying with a single financial software system to meet the competing needs of two departments often comes down to a knock-down, drag-out brawl. Satisfying one group usually means compromising the needs of the other. In the end, neither group gets exactly what it wants.

Only Walker offers financial packages that fully satisfy the requirements of both organizations. Without concessions by either group. Because user control and freedom from obsolescence are cornerstones, not afterthoughts, in the design of Walker's Integrated General Ledger, Accounts Payable, and Purchase Order Systems.

Now they only disagree on why Walker is the best

Financial Managers like the flexibility and independent control they get with Walker products. End users can interactively design and re-design screens and reports. Define key data fields to fit the most complex accounting structures. Even change system processing. Without relying on the DP staff.

Data Processing Managers can relax because Walker's advanced architecture, hardware/software independence, and technical sophistication won't become obsolete. So, as their environments evolve, Walker adapts. They avoid enormous dislocations and conversion costs.

Find out how your organization can keep the peace. Call or return the coupon below.

AT LAST... FINANCIAL MANAGERS AND DP MANAGERS AGREE ON SOMETHING: WALKER FINANCIAL SYSTEMS

☐ Please contact me for a demonstration
☐ Please send literature describing your family of products

Name
Title
Company
Phone
City
State
Zip
IBM Mainframe
Year
Oper. System

WALKER

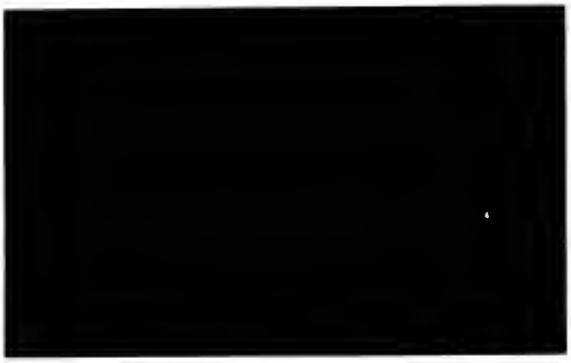
Walker Interactive Products
100 Spear Street, Suite 300
San Francisco, California 94105
(415) 495-8811

The SAS® System

Power Behind Every Window.

If you're "window shopping" for software that's both powerful and easy to use, take a look at the SAS® System for Personal Computers. It's got everything you're looking for...and more.

1 Ease of use. The SAS System has ready-to-use procedures for every kind of analysis and report—from simple to advanced, preformatted to customized. There's even a built-in menu system to guide you through the procedures, and on-line help is always available. Special windows let you define titles and footnotes for reports, check the characteristics of your data, change function key definitions, and keep notes.



2 Connectivity. With the SAS System for personal computers, you get a built-in link to your host SAS System. You can download corporate data; develop, test, and run applications on your PC; or move data and applications back to the host for execution. Plus the SAS System reads data from any kind of file, including dBASEII,® dBASEIII,® and Lotus® 1-2-3.®

3 Integration. The SAS System runs on mainframes, minicomputers, and personal computers. The language and the syntax are the same. The full-screen text editor is the same. You only have to learn one software system no matter what hardware your company has installed.

4 Expandability. As your needs grow, the SAS System grows with you. We're committed to supporting all the capabilities of our mainframe software system for your PC. Whether you license one product or several, you'll enjoy the same high-quality software, training, documentation, and support we've offered for 10 years. It's all part of our site licensing plan.

Call or write us today.

SAS Institute Inc.
Box 8000 □ SAS Circle
Cary, NC 27511-8000
Phone (919) 467-8000 □ Fax (919) 469-3737

The SAS System runs on the IBM PC XT and AT, IBM 370/30xx/43xx and compatible machines, Digital Equipment Corporation's VAX™ and MicroVAX II,™ Data General Corporation's ECLIPSE® MV series, and Prime Computer, Inc.'s 50 series. Not all products are available for all operating systems.

SAS is the registered trademark of SAS Institute Inc., Cary, NC, USA. dBASEII and dBASEIII are registered trademarks of Ashton-Tate. Lotus and 1-2-3 are registered trademarks of Lotus Development Corp. Copyright © 1986 by SAS Institute Inc. Printed in the USA.

MICROCOMPUTING

SMALL TALK

William Zachmann

An old dog's new tricks

There is nothing better, when encountering an old friend, than to find out that he has gotten even better since the last encounter. That describes my impression of Popdrop Version 3.0 from Infostructures, Inc. in Tucson, Ariz.

Recently enhanced in Version 3.0, Popdrop is billed as "The Memory Management Utility" and is extraordinarily simple in concept. The tool is a memory-resident utility, or terminate-and-stay-resident (TSR) program as it is commonly called. Popdrop's function, however, is to help you manage other TSR programs.

While TSR programs are tremendously useful, they can also be a pain in the neck. Although the functions they perform are often highly desirable, the programs take up memory, sometimes get into bizarre and destructive interactions with each other and require different steps to get out of memory — if they can be removed at all. Often, the only way out is to simply reboot the system.

Popdrop takes care of all

Continued on page 40

Televideo unveils workstation

Says Telestar/386 an inexpensive challenge to DEC, Sun, Apollo units

BY ED SCANNELL
CW STAFF

SUNNYVALE, Calif. — Televideo Systems, Inc. jumped into the engineering workstation market last week with an Intel Corp. 80386-based system the company claimed will cost about half as much as competing systems from Digital Equipment Corp. and Apollo Computer, Inc.

Christened the Telestar/386, the system contains a 16-MHz version of the 80386 processor and a 10-MHz 80387 coprocessor and allows users to run applications compatible with both AT&T's Unix System V, Release 3 and Microsoft Corp.'s MS-DOS concurrently under Microport Systems, Inc.'s MS-DOS Merge 386 operating environment.

While most engineering systems use the Motorola, Inc. 68000 processor, Televideo decided to use the 80386 because it can volume-purchase the 80386 processors less expensively, according to Philip Hwang, Televideo's chief executive officer. The 80386 also gives engineers, the majority of whom have Unix-based systems, access to MS-DOS-compatible applications, Hwang added.

"Most existing workstations are based around the 68000, but that market [engineering workstations] is a niche market. Because of the [greater] volume of the 80386, we can procure it at a lower cost," Hwang said.

Hwang said he believes the system will attract a rather diverse group of engineers that have been kept out of the workstation market because of price. The system ranges in price from $3,995 to $15,995.

Televideo said it will announce another 80386-based system at Comdex/Spring '87 next week. That system runs MS-DOS and will be used primarily as a file server, Hwang said. The company said it will also announce a terminal at the show.

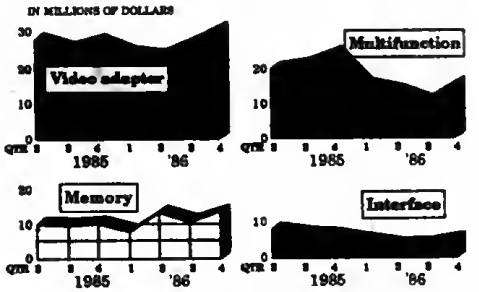
The Telestar/386 will support X Windows, developed by MIT, which runs several applications simultaneously.

Televideo said the Telestar/386 will be available in July.

Data View

Add-in boards

IBM PC boards purchased by microcomputer specialty stores



INFORMATION PROVIDED BY IMS AMERICA, LTD
CW CHART SUSAN ALDAM

Cards rev up publishing

BY JOSEPH FUSCO
SPECIAL TO CW

Users of IBM and compatible microcomputers cheered when Aldus Corp. released its long-awaited version of Pagemaker desktop publishing software. No longer would they endure Apple Computer, Inc.'s superiority in this new application. The IBM Personal Computer AT family of users, with an Intel Corp. 80286 at its disposal, might rejoice.

But the silver lining held a cloud for users of Intel 8088-

Continued on page 41

Wang line of micros enhanced

BY DOUGLAS BARNEY
CW STAFF

Despite an impending announcement of a line of microcomputers, Wang Laboratories, Inc. last week enhanced its existing Professional Computer and Advanced Professional Computer.

The enhancements include use of Microsoft Corp.'s MS-DOS 3.2, support for Xenix System V on the Advanced Professional Computer and a new mouse.

Wang claims some 400,000 users of the Professional Computer and Advanced Professional Computer and is enhancing the units to protect user investments. "A customer base of that size is of strategic importance," said Win Burke, Wang's director of desktop systems.

Observers said that Wang could have sold many more Professional Computers and Advanced Professional Computers, but the machines lacked total hardware compatibility with the

Continued on page 39

Inside

- Intel puts 80387 math coprocessor on the retail market. Page 39.
- Abra Cadabra Software releases Version 5 of its human resource system for IBM PCs and compatibles. Page 44.

Colvin: Micro Channel, PS/2 don't meet hype

This is the conclusion of a two-part series.

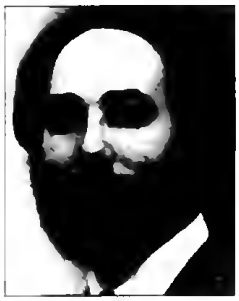
Neil Colvin is founder, chief executive officer and chief scientist at Phoenix Technologies Ltd., a custom engineering firm.

During the last several years, the company has made its reputation providing ROM BIOS products compatible with IBM's Personal Computer series to several major systems manufacturers.

Colvin is a good example of why one should put little faith in stereotypes of technical engineers. While some have made a lifestyle out of coding until midnight and living off pizza and Pepsi, Colvin has created a proper balance between work and his involvement in local theater.

Colvin, 37, has planned work and business trips around his involvement in writing, producing, directing and acting in local musical productions. He reluctantly tore himself away from a starring role in his latest production, "The Music Man," to talk with *Computerworld* Senior Editor Ed Scannell about another subject close to his heart: IBM's Personal System/2 and the issue of cloning it.

Is IBM's Micro Channel a duplication in miniature of the Multiplex channel IBM has used for years in its mainframes? Is there any technological relationship?



Phoenix's Colvin

The Micro Channel is not a channel by any of IBM's definitions. All it is is an internal bus. It doesn't have any of the characteristics of IBM's channels. They [IBM] used to have data cables and tag cables floating around for mainframes and peripherals daisy-chained around the room. That is a channel. This is not a channel, it is a bus. The closest thing we have to a channel is the Scuzzy bus.

What is the level of interest among manufacturers to bring back the Personal Computer Extended Technology Committee (PCETC) you helped organize last year?

I think there is a lot of concern on the part of manufacturers about the abandonment [by IBM] of the old standard. The other thing is there is a growing rebellion in Fortune 2,000 companies against IBM because they aren't providing an evolutionary path from the existing architecture. Users have to throw away all their cards.

The Micro Channel provides no user benefits that I can see at this point. There is nothing that the Micro Channel does that the user needs. The system's self-configuration — which eliminates dip switches — is nice, but we don't spend eight hours a day flipping DIP switches on our boards. I mean, this is not a big issue.

There is a very interesting problem associated with that. It seems like it is almost impossible to do multifunction boards for the Micro Channel. There is a limitation to how many bits of information the board can get back into the system on one board. It

Continued on page 46

Kurzweil to add intelligent scanner

Font-recognition ability seen as advantage over optical counterparts

BY DAVID BRIGHT
CW STAFF

CAMBRIDGE, Mass. — By using the software technology of its $40,000 intelligent character recognition (ICR) scanner, Kurzweil Computer Products, Inc. recently said it has developed an IBM Personal Computer-based unit selling for $9,950. The company, which is set to formally introduce the scanner at Comdex/Spring '87 next week in Atlanta, has also cut the price of its Kurzweil 4000 ICR system in half, to $19,950.

According to Kurzweil, the new Discover 7320 scanner can recognize a much greater variety of fonts than traditional optical character recognition (OCR) scanners. This is especially important as more and more laser printers — with their abilities to produce many different types of fonts — find their way into the office, Kurzweil said.

Initially targeted for reseller channels, the unit was designed for office work groups that need to input relatively small volumes of printed text and graphics into their PCs. It is reportedly able to scan material and feed it into a PC while the PC is running other applications.

Already trained

Compared with the larger scanner, the Discover 7320 has lower resolution — 300 by 300 pixels vs. 670 by 400 pixels — and does not require the user to "train" it before scanning.

One analyst who saw the Discover 7320 on a nondisclosure basis said he was impressed with the product and added that the superior ICR technology is forcing most OCR vendors to build ICR scanners also.

"In the olden days of daisy-wheel printers and typewriters, you only had so many fonts in the office," and the template matching method used in OCR scanners was sufficient, he said. "But now, with these laser printers producing so many fonts, it's no longer sufficient to just have one, or two, or 10 fonts anymore." Instead of comparing scanned text with text in a template, ICR scanners recognize text by analyzing it and teaching themselves as they go along.

The Discover 7320 system consists of a scanner, software and a Motorola, Inc. 68020-based board that fits into the PC.

The software converts scanned text into a variety of word processing formats, such as Microsoft Corp.'s Word and Micropro International Corp.'s Wordstar. One document can reportedly be converted into several different formats. Other features are said to include selective scanning of certain parts of a page and automatic graphics avoidance for skipping over letterheads and other unnecessary material.

Smooth Conversion
with
CTG/DATAWARE

Save money, time, and manpower on your conversion project with CTG/Dataware. Our skilled specialists work with you to ensure a smooth, timely, cost-effective conversion.

COBOL TO COBOL
RPG TO COBOL
ASSEMBLER TO COBOL
AUTOCODER TO COBOL
EASYCODER TO COBOL
PL/1 TO COBOL
RPG TO PL/1
DOS TO MVS

CTG Dataware has the total solution — software, methodology, and support services — to help you change hardware, programming languages, or operating systems smoothly and quickly. Call the conversion specialists, CTG Dataware.

1-800-367-2687

CTG
COMPUTER TASK GROUP INC.
DATAWARE CONVERSION SERVICES
3095 Union Road
Orchard Park, New York 14127 1214
716 674 9310 TELEX 510 100 2155

Intel ships 80387 math chip to retail market

HILLSBORO, Ore. — Intel Corp.'s Personal Computer Enhancement Operation (PCEO) recently began shipping the first 80387 math coprocessors intended for retail sales.

Designed to be used with the 80386 microprocessor, the 32-bit chip reportedly performs floating-point calculations four to six times faster than the earlier 16-bit 80287 math coprocessor.

Priced at $795, the 80387 has a clock speed of 16 MHz and operates in personal computers built around the 80386 chip and in systems using PCEO's Inboard 386 accelerator board

According to Intel, an Inboard 386 with an 80387 processes floating-point operations 200% faster than a combination of the Inboard 386 and a 10-MHz 80287 math coprocessor

Math-intensive applications are said to run 15% to 25% faster with the 80387 than with the 80287

Because the 80387 is compatible with both the 8087 and 80287 math coprocessors software written for those chips by more than 100 independent vendors can take advantage of the increased speed, according to the company

Such programs include Lotus Development Corp.'s 1-2-3 Autodesk Inc.'s Autocad and Borland International's Turbo Pascal

Lag time

The availability of the 80387 comes eight months after the first 80386-based systems were introduced

Earlier this month Compaq Computer Corp. announced that it had added a socket for the 80387 on the system board of its Deskpro 386

Compaq said that it will offer system-board upgrades for current Deskpro 386 machines

XEROX

They raved about Version 1.0. Now read about Version 1.1.

Xerox Ventura Publisher, the easily mastered, industrial-strength publishing genius that runs on a standard IBM XT or AT, or compatible, just got better. Version 1.1 offers 80 significant enhancements for short document handling; text, graphics and font support; and broader output capability.

Xerox Ventura Publisher already gets raves for long documents; now Version 1.1 offers 20 additional features for producing short documents. There's automatic kerning, support for multicolumn frames, improved hyphenation, cropping and sizing of art, on-screen rulers, and automatic letter spacing, to name a few.

For documents of any length, page layout and type control have been raised from excellent to sensational. Pictures are now anchored to text during batch pagination. Documents up to 128 chapters in length, each containing 150 to 300 pages of text, are easily handled. The result is a desktop publishing package that can be judged by printing industry graphic standards.

To the longest list of text and graphics input support in desktop publishing comes even greater capability. Version 1.1 adds word processing interfaces for XyWrite, Displaywrite III and IV and DCA files. There's graphic conversion for more than 500 graphics packages based on a dozen file formats, including Macintosh "PICT" and image files. Plus downloaded PostScript fonts, conversion of H-P Soft-fonts and support for Adobe screen fonts.

This new release makes Xerox Ventura Publisher the first desktop publishing program to support the industry-standard page-description languages: PostScript and Interpress. That means total compatibility with all popular laser printers, including, of course, the Xerox 4045 Laser CP and the Xerox 4020 Color Ink-Jet Printer.

Xerox Ventura Publisher 1.1—industrial-strength publishing genius that lets you do so much more, so much faster, ever so easily—right on the desktop.

Xerox brings out the genius in you.

For more information about Xerox Ventura Publisher 1.1, stop by any computer store featuring Xerox software, contact your local Team Xerox sales office, or call 1-800-TEAM-XRX, ext. 213B.

NAME TITLE

COMPANY

ADDRESS

CITY STATE ZIP

213B

XEROX is a trademark of XEROX CORPORATION

Wang micros

FROM PAGE 37

IBM Personal Computer The new Wang microcomputers, based on Intel Corp.'s 80286 and 80386 processors, will be announced "shortly" and will be fully hardware-compatible with the IBM PC, XT and AT according to the company. The machines are not expected to be hardware-compatible with IBM's new Personal System/2 line

The use of MS-DOS 3.2 is said to improve the compatibility of the machine by allowing IBM PC and Wang software to be run from the same Wang menus Since MS-DOS 3.2 is used on the Wang Laptop and will be used on the still-unannounced line of Wang microcomputers, compatibility among the Wang line will be improved

With Xenix System V, which is offered as an option for the Advanced Professional Computer, up to eight users can access the Advanced Professional Computer simultaneously. Xenix System V replaces Xenix System III. In an effort to optimize the use of Xenix System V on the Advanced Professional Computer, Wang plans to offer a $995 expanded high-speed system memory board with up to 5M bytes of random-access memory a $2,500 streaming-cartridge tape drive and a $750 multiple-terminal controller

A new $150 Wang M7 mouse for the Professional Computer and Advanced Professional Computer handles multiple mouse formats

MANAGEMENT
REPORTING/RETRIEVAL
CAPABILITY
for THE IBM S/38
For more information
Contact Charles White at
michaels ross & cole ltd
800 West Roosevelt Road
Building E Suite 304
Glen Ellyn IL 60137
(312) 790-5040

New tricks

FROM PAGE 37

that. It lets you move TSR programs in and out of memory simply and easily. Either manually or through batch files, Popdrop gives you complete control over what memory-resident routines are currently loaded and in what order.

With Popdrop Version 3.0, you can create up to 16 layers of memory-resident programs, up from eight in Version 2.0. The earlier version required about 1.5K bytes for each layer of programs loaded. Version 3.0 only takes about 600 bytes for the first layer and 200 more for each additional layer.

The key to this economical use of memory is that Popdrop is not a TSR program in the usual sense. The program itself is invoked from disk when needed. Instead, Popdrop uses the TSR strategies with DOS to simply leave needed data in memory to let Popdrop do its job.

When active, Popdrop rearranges DOS memory allocation tables and vectors among the true TSR programs to achieve the desired results.

As in the previous version, Version 3.0 lets you add and delete individual programs as well as entire layers of programs.

In addition, Version 3.0 makes it possible to activate and deactivate individual layers at will. That way, you can turn off TSR utilities and restart them later without having to remove and reload programs.

Diagnoses and corrects

In addition to providing excellent facilities for managing TSR programs, Popdrop Version 3.0 adds capabilities to diagnose and correct unhappy reactions among them. A Hooks command conveniently displays the DOS interrupt vectors used by current resident programs.

This can be a big help in the hands of a sophisticated user in sorting out what is clobbering what and why when conflicts among memory-resident programs are suspected.

Popdrop is not copy protected. At only $49.95, Popdrop Version 3.0 is a terrific bargain. Users of earlier versions can upgrade to Version 3.0 for $30. It runs on all IBM Personal Computers, including the new Personal System/2 models, with all versions of Microsoft Corp. MS-DOS and IBM PC-DOS 2.0 through 3.3.

Zachmann is vice-president of research at International Data Corp.

Colvin

FROM PAGE 37

you have a board with 14 or 15 functions on it, like serial, parallel, clock, memory or power, there seems to be no way in the specification to have that board go into the Micro Channel machine.

The other advantages are burst-mode direct-memory access and the multimasters. The burst-mode direct-memory access is important because it gives you high-speed, nonbuffered mass storage devices. With peripherals that are buffered on the controller board, the PCETC's bus burst-mode direct-memory access is virtually identical in terms of performance. The third thing is multimasters should be able to support three or four masters on the bus or a couple of coprocessors of some form. That is nice, but why do we need it? What applications, besides some pretty bizarre things with custom hardware, do you see using coupled processors on the bos in the future?

What are the possibilities?

Well, I'll tell you what I see. You can take a whole different look at the [PS/2] announcements and see that IBM didn't announce a new line of personal computers but in fact was getting out of the personal computer business. What they are doing is announcing products to go after Digital Equipment Corp. I mean, the [PS/2] Model 30 is ridiculous and will maybe be sold to the education market. No person in their right mind would buy one unless they were forced by management to do so.

The [PS/2] Model 50 is a terrible performance machine. It has a slow disk drive and has only three slots that can't be expanded. It's a silly personal computer.

IBM's argument is that they have created a more balanced architecture in the Micro Channel that lets it run faster than it appears to on paper.

Load up the disk with 20M bytes of data and then see how fast it does disk reads and writes.

Even with its disk-caching feature?

It degrades more than the PC AT does. There is something in there, I don't know what it is, but it degrades incredibly rapidly. But the Model 50, given its price, there are better machines on the market. The AST Research, Inc. Premium 286 runs rings around it for less money.

So the interesting machines are the [PS/2] Models 60 and 80. They aren't designed as personal computers but as departmental servers. Now whether they are designed as [DOS] 3X replacements or a new line of things complementing the 3X is hard to say. But if that's the case, tightly coupled processors make sense. So, does that mean 370 boards? Probably. Does that mean 3X boards? Probably.

You can see those machines as the basis for providing departmental servers that provide backward compatibility for existing product lines. That is why you would need tightly coupled processors. Now that's a very unique niche market. It is not the majority of the market. It is also going into a market where DEC now has the lead.

What do you think of Microsoft Corp.'s MS OS/2?

Well, [Microsoft Chairman] Bill Gates said it well. MS OS/2 is a product for two years from now. We are talking about the end of next year before we have a product you can write applications to. Also, there is no relationship between OS/2 and PS/2. OS/2 will run on every IBM PC AT in the field. We don't think OS/2 will be used by more than 20% of the machines in the field.

WITH MCI® AND LOTUS®, WHAT YOU SEE

Introducing Lotus Express™ for MCI Mail.®

Now the leaders in electronic mail and business productivity software join to help you realize the full power of your PC. With Lotus Express for MCI Mail, if you can create it, you can send it. All with a few keystrokes.

Lotus Express is communications software for your IBM PC or compatible. Now you can send and receive graphics, messages, order forms, documents and files from any program in revisable form. Or spreadsheets like 1-2-3® with formulas and formats intact. Lotus Express runs in the background. It automatically picks up your mail and stores it on

Cards rev up

FROM PAGE 37

based PC XT compatibles.

First, Pagemaker must be used with a mouse. Second, the program requires a hard disk, a graphics environment and Microsoft Corp.'s Windows. Serious PC XT users already have hard disks. Graphics, particularly minimal IBM Color Graphics Adapter (CGA) graphics, are expected by desktop publishers.

But Windows traumatizes PC XT users, most of whom know this operating environment only by its reputation for sluggishness.

Perhaps Aldus sensed this as well, for Pagemaker's third significant requirement calls for PC AT-type machines.

The card's the thing

Will desktop publishing force PC XT users to buy new computers? Thanks to the following simple upgrade, the answer is no. The key is an accelerator card. Accelerator cards boost the processing speeds of PC XT-class computers from 4.77 MHz to between 8 and 12 MHz.

This increase is essential for advanced desktop publishing programs that need faster processing to shorten wait times.

But processing represents very little of a microcomputer's work. Throughput, the real measure of work accomplished, depends upon slow 8-bit data paths, slower disk-access times, very slow printers and criminally slow keyboard entry.

Great expectations

Realistically, users can not improve throughput by 100% to 200% simply because their accelerator card's processor calculates that much faster. Yet in special situations, like desktop publishing, accelerator cards really perform.

PC XT-class users who already have a mouse will find that any accelerator card will run Windows/Pagemaker at an acceptable speed.

Some popular cards are MCT's Speed Demon, Micro Way, Inc.'s Number Smasher, Microsoft's Mach 10, PC Technologies, Inc.'s 80286 board, Orchid Technology, Inc.'s Tiny Turbo and Quadram Corp.'s Quadsprint. These typically cost between $400 and $600.

Those without a mouse will quickly find their selection narrowed to Microsoft's Mach 10. For about $500, the Mach 10 package includes a mouse, which saves spending another $200 (and perhaps using another precious bus slot).

With an accelerator board supported by a hard disk, CGA graphics, Windows and a mouse, PC XT Pagemaker users are ready to publish. But a few other items deserve consideration.

The accelerator card solution is directed at the PC XT owner who uses desktop publishing along with other applications, such as word processing and spreadsheets. This "mixed-application" user, as demonstrated, does not require a PC AT-type machine.

Full-time desktop publishers, in contrast, will want to buy another computer anyway, so it might as well be in the PC AT-class.

Between the occasional and full-time desktop publisher lies the middling user who, for example, anticipates three to five weeks of publishing every quarter. This user can stay with a PC XT given the following caveats.

Disk I/O might be too slow for the middling PC XT user. Disks with 40-msec head-access times, instead of the more common 70-msec access times, will solve this problem, but a random-access memory (RAM) disk is better.

The 640K-byte memory limit typical of PCs and PC XTs forces desktop publishing programs into repeated disk accesses when making document changes. Here, even a 40-msec disk will probably be too slow for the mid-level user.

The answer is extended memory configured as a RAM disk. For about $400, add-in memory, such as Intel's Above Board or AST Research, Inc.'s Rampage, provides the extra speed that many users require.

If bus-slot availability becomes a problem at this point, look for multifunction products like Intel's Above Board PS/PC, which includes a serial port, parallel port, clock, calendar and up to 1.5M bytes. Note that 256K-byte RAM chips are not included in the basic price, but one 256K-byte RAM chip may be enough for desktop publishing.

Too many cooks . . .

Mid-level PC XT users must plan their desktop publishing upgrades carefully to avoid running out of bus slots. The multifunction Microsoft Mach 10 accelerator/mouse card and the Intel Above Board PS/PC offer two immediate solutions.

Using a serial-port mouse, an external modem or opting for an expansion chassis may also help. But too many add-ons, no matter how cleverly configured, can quickly justify the cost of a new PC AT-type machine.

Micro Way's combination accelerator/memory card is an excellent multifunction solution for the PC XT desktop publisher with only one more bus slot. The $1,280 Micro Way card with a cooling fan (but without a mouse) is the only alternative for this "tight-fit" upgrade.

Adding it up

With $800 to $1,000 invested in an accelerator card, mouse and add-in memory, the PC XT desktop publisher will remain $900 to $1,100 less expensive than the cost of even an Asian PC AT clone. But adding an expansion chassis and 1.5M bytes of 256K-byte RAMs tips the cost scales in favor of selling the PC XT and buying a PC AT.

The final word on this upgrade concerns networking and peripheral management. Apple recently announced a half-card emulator for the PC XT. This will allow PC XT Pagemaker users to plug into an existing Apple network and access an Apple Laserwriter printer.

In summary, the Pagemaker-PC XT connection is not for everyone, but where it works, accelerator cards make it work just as fast as a Mac Plus.

Fusco is a microcomputer consultant with expertise in desktop publishing

IS WHAT THEY'LL GET. IN SECONDS.

your disk. It even signals when you have incoming mail, lets you access your messages without interrupting your program, and allows you to file all your messages in electronic folders. So the mail goes through, even while you're busy with other applications. You can transfer any file from PC to PC. Or send messages by postal, courier or telex delivery–anytime, anywhere–via MCI's worldwide communications network.

Lotus Express costs only $100. At this price, your business can't afford not to have Lotus Express. And with the high cost of overnight delivery service, it can pay for itself in a few days–or less. Order now, and we'll give you a bonus–a FREE one-year subscription to MCI Mail.* A whole new level of productivity is just a phone call away.

Call today, toll-free, 1-800-345-1043.

MCI

COMMUNICATIONS FOR THE NEXT 100 YEARS.℠

*Regular MCI Mail message charges apply. Ask for #CA1757

® MCI, the MCI logo and MCI Mail are registered service marks of MCI Communications Corporation (MCIC). ℠COMMUNICATIONS FOR THE NEXT 100 YEARS is a service mark of MCIC. © MCIC December 1986. ® LOTUS and 1-2-3 are registered trademarks of Lotus Development Corporation. ™Lotus Express is a trademark of Lotus Development Corporation. IBM is a registered trademark of International Business Machines.

If You're Considering DB2,

If you're looking for the full power of relational technology, there's just one place to find it: SUPRA™ from Cincom®. Because no other DBMS gives you the advanced relational capabilities to reach such high levels of performance and productivity.

Not even DB2 from IBM®.

More and more companies with an eye for success are capitalizing on all-new, advanced relational SUPRA—companies like Heublein, Heinz U.S.A., Best Western and over 150 others. And it's easy to see why. Each day, they realize the rewards of the innovative *three-schema architecture* that enables SUPRA to soar above and beyond DB2.

SUPRA's advantages are clearly visible: Unmatched performance. Advanced relational implementation. Referential integrity. Integrated 4GL capabilities. Entity integrity. Redundancy management. Automated data design tools. Dictionary facilities. MVS, DOS and VM versions. And more. Much more.

IBM is a registered trademark of International Business Machines Corporation.

You Better Face Up To SUPRA™.

It's no wonder industry experts have called SUPRA the most advanced relational DBMS on the market.

Find out how SUPRA can take you to new heights of productivity. Send in the coupon, or call us today.

You'll soon discover why no other relational DBMS can face up to SUPRA.

See Why DB2 Falls Prey To SUPRA.

Please send me the following on SUPRA ____ Literature
____ Electronic Brochure ____ Seminar Schedule
____ Please Have A Salesman Call Me

Return coupon to: Cincom World Headquarters, 2300 Montana Avenue, Cincinnati, OH 45211, Attn: Marketing Services Dept. Or, call us toll-free at.

1-800-543-3010

In Ohio, 513-661-6000. In Canada, 1-416-279-4220.

Name ____
Title ____
Organization ____
Address ____
City ____ State ____
Zip ____ Phone ____

CW05258

CINCOM

"What we used to call competition, we're now calling prey."

NEW PRODUCTS

Systems

Cubicomp Corp. has announced the **Picturemaker/30 Model 332** and the **Picturemaker/20 Model 322**, three-dimensional computer graphics systems based on Intel Corp. 80386 microprocessor technology.

The systems include an 80386-based IBM Personal Computer AT-compatible computer with hard and floppy disk drives, a red-green-blue color monitor, a data tablet, a CS/16 digital frame buffer and software.

Picturemaker/30 Model 332 is an animation system, and Picturemaker/20 Model 322 was developed for creative design presentations and corporate graphics. It can be upgraded to a Picturemaker/30 animation system.

Picturemaker/30 Model 332 costs $54,500. Picturemaker/20 Model 322 costs $41,500.

Cubicomp, 21325 Cabot Blvd., Hayward, Calif. 94545.

Software applications packages

Productivity Concepts Corp. has introduced **Infomanager**, a personal computer hierarchical and relational data base system.

Infomanager is said to allow any number of record types to be linked vertically via a hierarchical structure, with any record owning as many subrecords as needed to store related information.

All data can be inserted into the data base at the highest level at which it is unique.

Infomanager is said to use conversational English commands, menus and function keys. It features Help screens, automatic data entry screens, indexing and links between related records of different types.

Infomanager is priced at $249.

Productivity Concepts, P.O. Box 3088, Oakton, Va. 22124.

FAST CATS

Powerful PC Software to track Mainframe and PC Assets. Now at an exciting new price.

If you've been looking for a highly specialized inventory system to keep track of computer assets, welcome to the sleek, agile world of CATS. The PC based computer assets tracking system designed for those who are *serious* about control and management of PC and mainframe hardware, software and data lines.

ONLY $995. Brought to you by the same people who developed TESS, a similar data center management product for the mainframe, CATS offers many of the same characteristics at a fraction of the cost.

Previously priced at $5,900, CATS is installed at data centers throughout the United States and Canada. Now this spectacular system is available to you for only $995. And it runs in a ***non-copy-protected*** mode on any IBM® or compatible PC with DOS®, minimum 512K memory and a hard disk.

Track thousands of Mainframes & PC's. Written in dBase® and Clipper® compiled for processing speed, CATS has no file size limit, allowing you to track thousands of PC's and mainframe devices.

You'll have mass update capability. Duplicate function for adding data. Pop-up windows for narrative comments. Special queries and reporting capabilities by PC or mainframe configuration ID. Easy-to-use menus and screens for data entry, on-line inquiry and flexible reporting. What's more, the databases can readily be used by dBase III®, Lotus 1-2-3® and other popular software packages.

Inventory Management. But speed and agility are only the beginning of the CATS legacy. You'll find yourself back in control of the order-receipt process. Inventory management will become a breeze with features like on-line invoice approval and configuration path, "what if" budget forecasting, "mass" price updating, "charge back" ability and "next action" tickler. Problem management becomes no problem. Managing changes that affect the data center will be greatly simplified. And the time spent managing DP assets will be significantly reduced.

When you're ready to get serious — completely serious — about managing literally thousands of data center items in a quick and efficient manner, think fast. Think CATS.

TO ORDER OR FOR A FREE DEMO DISKETTE — PHONE 1-800-248-5667. (In Texas 214-823-2784

Payment Methods: Company Check, MasterCard, VISA, COD, or Purchase Order Number (we'll bill you)

Cats

A product of
BENDATA Management Systems, Inc

4144 N. Central Expy., Suite 530, Dallas, Tx. 75204, (214) 823-2784

IBM and PC DOS are registered trademarks of International Business Machines Corp. Lotus and 1-2-3 are registered trademarks of Lotus Development Corp. dBase III is a registered trademark of ASHTON-TATE. Clipper is a registered trademark of Nantucket Corporation.

Software utilities

Snow Software Corp. has announced its **Snow Report Writer** for use on IBM Personal Computers and compatibles.

The Snow Report Writer is said to be capable of reading most file formats. It can be used as a stand-alone or with data files from data base, word processing or business applications, such as Ashton-Tate's Dbase III and Micropro International Corp.'s Wordstar. Data base and word processing applications can be linked to spreadsheets such as Lotus Development Corp.'s 1-2-3. According to the vendor, data from eight file formats can be combined into a single report on the screen.

The Snow Report Writer costs $695.

Snow Software, 2360 Congress Ave., Clearwater, Fla. 33519.

Software enhancements

Abra Cadabra Software has released **Version 5** of its **Abra 2000** human resource system for the IBM Personal Computer and compatibles.

Version 5 is said to include features for handling the Consolidated Omnibus Budget Reconciliation Act benefits law as well as an attendance-tracking module for calculating accrued vacation, illness, personal time and yearly carryover for each employee.

The Standard Abra 2000 system costs $995. The attendance module costs $395.

Abra Cadabra Software, 11 Worcester Lane, Los Gatos, Calif. 95030.

Data storage

Priam Corp.'s Systems Division has introduced **Run Length Limited** (RLL) storage systems for the IBM Personal Computer AT and compatibles and Intel Corp. 80386-based personal workstations.

The RLL storage systems are available in capacities of 75M, 100M and 230M bytes. The systems are integrated kits consisting of an RLL-tested and -formatted 5¼-in. Winchester disk drive, an RLL controller, interface cables and installation and partitioning software.

Prices range from $1,700 to $4,100.

Priam Systems Division, 20 W. Montague Expwy., San Jose, Calif. 95134.

Printers/Platters/Peripherals

Qume Corp. has unveiled **Correspondence, Business** and **Financial** application-specific daisywheel printing systems.

The Correspondence package includes the 45 char./sec. Letterpro Plus printer, the Qume Profeeder 10, Wordperfect word processing software from Wordperfect Corp. and the Turbo Lightning on-line spell-checker and thesaurus from Borland International.

The Business package includes the Sprint 11/55 55 char./sec. printer and Turbo Lightning. The Financial Package includes the 50 char./sec. Sprint 11 Plus 130 printer.

Prices for the Correspondence, Business and Financial packages are $1,195, $2,195 and $2,995, respectively.

Qume, 2350 Qume Drive, San Jose, Calif. 95131.

NETWORKING

DATA STREAM

Clare Fleig

Cooking up SAA strategy

This is the conclusion of a two-part series

Last week, we summarized elements and functions of IBM's Systems Application Architecture (SAA), taking a look at the long-term goals for SAA and two SAA categories: the Common User Interface and the Common Programming Interface. This column will explore IBM's plans to implement an open, yet Systems Network Architecture (SNA)-dependent, strategy through the Common Communications Support element of SAA. It will also look at SAA migration issues confronting both IBM and third-party developers.

Common Communications Support is being implemented for a range of currently available IBM communications products and architectures. At its most basic, Common Communications Support provides the method by which applications developed by IBM or third parties perform shared tasks such as file sharing, data storage and creation of mail services.

Initially, the architectural support will include data streams (IBM 3270 data stream, Document Content Architecture, Intelligent Printer Data Stream); applications services such as

Continued on page 47

Bridging the OSI-TCP/IP gap

DEC, Network Research supply computers, software for NBS project

BY ELISABETH HORWITT
CW STAFF

Digital Equipment Corp. and Network Research Corp. have agreed to provide computers and software for a new National Bureau of Standards (NBS) project to develop gateways between Open Systems Interconnect (OSI) and Department of Defense networking applications that run with Transmission Control Protocol/Internet Protocol (TCP/IP).

The protocols, which are part of the Defense Department's effort to migrate to the OSI networking standard, will also be available to vendor and user organizations as public domain software, noted Kevin Mills, chief of the NBS Systems and Network Architecture division. Once the gateway specifications are completed, the Defense Communications Agency will incorporate them into its procurements for gateway products. In the meantime, NBS will develop prototype gateways that "prove the specifications are workable and give interim capability that can be used as testing until the procurements are finished," Mills noted.

NBS plans to release specifications this summer for a gateway between the Defense Department's Simple Mail Transfer Protocol and OSI Message Handling Facility/X.400 electronic mail protocols. At approximately the same time, NBS said it plans to have developed a system for testing whether products comply with the gateway specifications. A gateway between the military's File Transfer Protocol and OSI File Transfer, Access and Management protocol is planned for release in January 1988 with a testing system to be available in March of that year.

DEC and Network Research are the first vendors to respond to NBS's request for computer equipment and software for the gateway development effort; a third vendor, whose name has not been released by NBS, may

Continued on page 52

Groping for keys to net managing

BY DONNA RAIMONDI
CW STAFF

ATLANTA — Users and vendors tried — and failed — to define the key components of a good network management system during the spring meeting of the Network Users Association (NUA) held here recently.

Defining network management is difficult because each network is different, said Peter Pappas, director of telecommunications at Combustion Engineering in Stamford, Conn., and chairman of the NUA's network management subcommittee.

"I would like to make a report card with a list of management issues that would be as useful to the little network as to the big one," Pappas said during a conference workshop.

Pappas produced an 11-item list for the proposed report card, which included everything from host-access method failures to historical network performance data. NUA members commenting on the list, however, said that they did not consider all of those items to be part of network management

Programmer and network

Continued on page 52

UPDATE

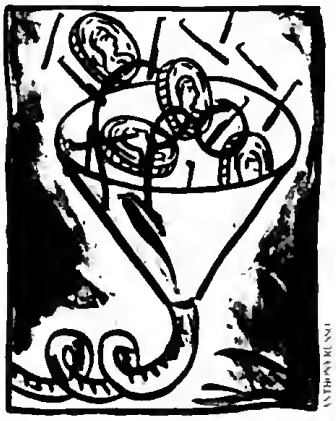
Get more from leased lines

BY LEONARD A. HINDUS
SPECIAL TO CW

Data compression is a simple yet effective way to battle rising telecommunications costs. And merging data compression with another basic communications technology — statistical multiplexing — creates a data transmission technique that is raising eyebrows and lowering telecommunications bills in many DP shops. Here are a few examples:

- By installing multiplexer/compression devices, Metropolitan Life Insurance Co. achieved a 60% reduction in the number of point-to-point leased lines, garnering savings in excess of $2 million a year. The devices were installed in the company's existing IBM Systems Network Architecture (SNA) network without any degradation in

Continued on page 50



ANTHONY RUSSO

Inside

- **Adesse enhances Contact for interaction with IBM Profs. Page 46.**
- **AT&T plans direct-dial interstate price cut. Page 46.**
- **Dial-Guard develops in-line computer security product. Page 53.**

Modems, Multiplexers, and Much More...

Warning: Bargains can be hazardous to your network.

Some people feel that price is the only thing that matters when it comes to modems. Our customers feel differently. If you also feel that quality, support and company stability are just as important as price, we offer you our 2400/1200 bps error-correcting MultiModems,™ in desktop, internal PC and rack-mounted versions. And if your network is ready for multiplexing, we offer our MultiMux™ 4- and 8-channel statistical multiplexers.

MultiModems and MultiMuxes are manufactured in Minnesota by Multi-Tech Systems (as they have been since 1970), and provide exceptional quality at an economic price. If you are not already a Multi-Tech modem or mux user, please call us toll-free today, at

1-800-328-9717.

MultiTech Systems

Multi-Tech Systems, Inc. • 82 Second Avenue S.E. • New Brighton, MN 55112 • (612) 631-3550 • (800) 328-9717 • FAX 612-631-3575 • TWX 910-563-3610

Conference tool talks to E-mail systems

BY ELISABETH HORWITT
CW STAFF

DANBURY, Conn. — Interaction with IBM Personal Computer software and host-based electronic mail systems are among the enhancements that have been added to Adesse Corp.'s Contact VM/SP Computer Conferencing a product designed to add value to IBM's Professional Office System (Profs).

The fruits of a two-year development project at Adesse, Contact Release 2.0 is said to include more than 50 enhancements, including a full-screen user interface and interaction with electronic mail systems such as Profs, CMS/Notes, Digital Equipment Corp.'s All-In-1 and RFC822, an electronic mail system that runs on the Department of Defense's Arpanet.

While Profs provides electronic mail services and document management with "limited many-to-many communications," Contact provides an asynchronous electronic-conferencing and bulletin board service for multiple users within the IBM CMS environment, according to Adesse's Tom Foth. Users can make information generally available, or "ask anyone who happens to be around a question," Foth said.

Another Contact feature, key word search, allows users to call up all documents on file that relate to a given subject. "So when you have a question you can check to see whether it has already been asked and call up the expert's answer," Foth said.

Contact 2.0 can be interfaced with any electronic mail system through a programming effort of approximately one man-week, Foth said. Interfacing with an IBM PC file-transfer package takes approximately one day, he added. Support for VM Personal Computing, Inc.'s Relay and Columbia University's Kermit file-transfer program are built into Version 2.0's PC interface.

Also introduced with the release is an exclusion facility that allows users to tune out of bulletin board exchanges when they are not interested in the subject. Users also can monitor access to a file to determine what audience their information is reaching. A new full-screen menu feature is consistent with the Profs format. Line- and command-mode menus are also available with the system.

Future enhancements are slated to include file-sharing with full security and conferencing for users on multiple VM systems. The latter feature will be available through IBM's TSAF and the VM/SP 5 operating system, Foth said.

Contact 2.0 is priced at $15,000 for purchase or $350 per month to lease.

WITH FULL-SCREEN CICS TESTING & DEBUGGING

[illegible] moves the hassles of testing and [illegible] programs by bringing the full-[illegible] use features of the XPEDITER product [illegible] COBOL programs under MVS or MVS XA.

[illegible] application programmer's needs [illegible]

- [illegible] an easy-to-use ISPF like interface
- Provides source level testing and debugging
- [illegible] intercepts abends and lets you continue testing
- Protects against storage violations

XPEDITER CICS is a practical tool that all CICS COBOL programmers can use. By helping them solve problems faster and test their programs more thoroughly XPEDITER CICS pays for itself in a matter of months.

The XPEDITER product family provides [illegible] approach to testing across environments:

- XPEDITER TSO for TSO ISPF BTS and Batch
- XPEDITER CMS for the VM CMS environment
- XPEDITER IMS for the IMS DC environment

To find out more about XPEDITER CICS and [illegible] XPEDITER products or to request a free demonstration diskette please call [illegible]

[illegible] SYSTEMS, Inc.
[illegible] Avenue North • Minneapolis, MN 55445

The Industry Leader for Testing and Debugging

AT&T to cut long-distance rates again

WASHINGTON, D.C. — AT&T plans to lower direct-dial interstate long-distance prices by approximately 4.8% at all hours, effective July 1.

This latest price cut will bring reductions in AT&T's long-distance prices to nearly 16% this year, and nearly 34% since the Bell system was broken up in 1984, AT&T said.

Beginning July 1, there will be a 60-cent increase in the current $2 fee that homes and small businesses pay local phone companies to cover part of the fixed costs of connecting their telephones to the local exchange.

In turn, the local telephone companies are lowering the charges AT&T and other long-distance companies pay for communications access to customer's homes and businesses.

This means AT&T will save approximately $590 million in lower access costs, passing along the savings to customers — dollar for dollar — by reducing long distance prices.

In addition, AT&T petitioned the Federal Communications Commission on May 15 to approve the following reductions:

- Cut Reach Out America's initial hour and evening option fees by 4.8%.
- Cut AT&T's Pro America I, II and III family of services by 4.8%. The FCC was also requested to approve adding AT&T card calls to the plan.
- Cut AT&T's 800 Readyline usage prices by 4.8%.

LU 6.2
It's a Jungle.
Let DPS be *your* Guide.
REQUIREMENTS
DESIGN
IMPLEMENTATION
TROUBLE SHOOTING
Diversified Programming Services, Inc.
dPs
(415) 333-6200
136 Everson Street
San Francisco, CA 94131

SAA strategy

CONTINUED FROM PAGE 45

SNA Distribution Services, Advanced Program-to-Program Communications and Low Entry Networking; and two industry networking standards — CCITT X.25 and the Token-Ring. As the specifications evolve, other products, including voice support via a computerized branch exchange, will be provided under the SAA umbrella.

Taken together, communications support, programmer interfaces and a common user access will allow for the development of common applications that will operate under SAA on incompatible systems as if they were running on the same system. At first, IBM will focus on office applications for document creation, document storage, document transfer and decision support with secondary focus on industry-specific applications. With that accomplished, IBM will have effectively ended the debate about its wide variety of incompatible systems by simply eliminating the question.

Via SAA, IBM is attempting to create the same kind of applications portability now found primarily in the Digital Equipment Corp. VAX environment. But there is one key difference: SAA specifications have been developed to be part of an SNA network, with the host, as always, maintaining a key controlling function. Although some SAA-compatible products — IBM's OS/2, for example — will be able to operate in a stand-alone mode, and applications will be portable across systems, users will only be able to take full advantage of these products in an SNA-controlled environment.

When the architectures are fully implemented, corporate users will be less dependent on the host but more dependent on the functions of SNA and on products provided directly from IBM.

Products, services and applications based on the SAA guidelines will be implemented in phases, beginning with office-based applications such as Enhanced Connectivity Facilities, which is slated to be released in September.

Release plans for Microsoft Corp.'s MS OS/2 operating system for the IBM Personal System/2 typify how certain key products will be gradually moved under the SAA umbrella. IBM's OS/2 Standard Edition Version 1.0, due for release in early 1988, does not include support for SAA. IBM's OS/2 Standard Edition Version 1.1, which is likely to be available in the third quarter of 1988, will support the SAA presentation interface. It will not support any other SAA element.

OS/2 Extended Edition, likely to be released in the late 1988 to 1990 time frame, is a full implementation of SAA standards with support for Common User Access, Common Communications Support and the currently announced applications programmer interfaces.

A far more difficult task awaits software and systems developers planning SAA migration for existing products designed for older IBM environments. End users, MIS executives, third-party programmers and IBM will all benefit from SAA, but the benefits won't be realized without a cost.

Fleig is director of systems research specializing in local-area networking and IBM communications for International Technology Group in Los Altos, Calif

BIT BLAST

Local Bell to run net trials

New England Telephone & Telegraph Co. recently announced that it would begin implementing Integrated Services Digital Network (ISDN) on a trial basis this summer. The network will support voice, text, data and video transmission over ISDN links and is part of an overall network modernization and construction plan for which the divested Bell operating company has budgeted $2 billion for the period between this year and 1989.

The plan calls for the company to more than double its current installation of digital and fiber-optic transmission facilities, a company spokesman said. New England Telephone has installed more than 50,000 miles of fiber-optic cable and approximately 100 digital switches so far.

Vitalink Communications Corp. has expanded the network management capabilities of its IEEE 802 wide-area network links between geographically separate Ethernet local-area networks. New software allows 802 wide-area networks to determine the most efficient routing paths between remote devices on a network, the vendor said. An 802 wide-area network can now put backup facilities into operation when it senses circuit breakdowns and network congestion. Vitalink also announced an optional 1.5M bit/sec. DS1 interface for its Translan bridges. Priced at $4,000 for existing Translan systems, it is a standard feature with Translan IV. The management software is available free of charge within 90 days as an upgrade, Vitalink said

Integrated Telecom Corp. in Richardson, Texas, will resell SR Systems' X.25 packet-switching systems as optional add-ons to its Digital Access and Cross-Connect System family of T1 switches. The X.25 packet assembler-disassembler and X.25 Switch Modules cost between $1,100 and $5,000, depending on configuration.

Streamline your DP operations with a Tandy® 3000 HD system and XENIX®.

Break away from your mainframe with the powerful Tandy 3000 HD and the versatile XENIX System V operating system. The high-performance Tandy 3000 HD helps make systems development more efficient and cost effective

The Tandy 3000 HD is compatible with the IBM® PC AT, yet offers greater hard disk storage (40 MB vs. the PC AT'S 30). Better yet, the 3000 HD is priced at only $4299 (vs. $5295 for the PC AT*).

Based on the 16-bit Intel® 80286 microprocessor, the Tandy 3000 HD (25-4011) operates at 8 megahertz. And since the 3000 HD is a multiuser system, people throughout your office can access it from inexpensive data terminals, for program development, as well as user applications

Come into a Radio Shack Computer Center today. The Tandy 3000 HD is your key to total office automation

Send me a Tandy 3000 brochure
Mail To: Radio Shack Dept 87-A-1213
300 One Tandy Center Fort Worth TX 76102
Name _____
Company _____
Address _____
City _____ State _____
ZIP _____ Phone _____

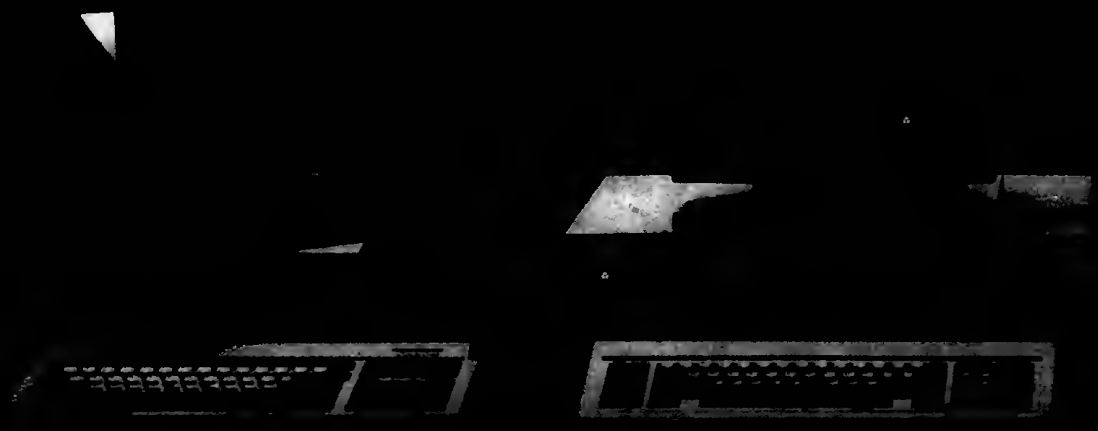
Radio Shack
COMPUTER CENTERS
A DIVISION OF TANDY CORPORATION

*Based on IBM price list as of January 1987 *Tandy 3000 HD price applies at Radio Shack Computer Centers and participating stores and dealers. Monitor, data terminals and XENIX sold separately. XENIX/Reg. TM Microsoft Corp. IBM/Reg. TM International Business Machines Corp. Intel/Reg. TM Intel Corp.

THE VISI
NEED TO

The New 965
Display Terminal

The New TeleNIX 386



Here's a look at the best news at COMDEX. The most complete line of
386's available. Plus the most advanced, most affordable high-performance

ON YOU SUCCEED.

The New 386
Engineering Workstation

The New Tele 386

terminal we have ever seen. Stop by our booth, or call us at 1-800-835-3228.
It could be the first step on the path to success.

TeleVideo

COMDEX BOOTH #940

Leased lines

FROM PAGE 45

network performance.

• Data-Link Systems, Inc., a South Bend, Ind.-based service bureau that provides software packages for the integrated banking and mortgage banking communities, reports that it can now double the effective throughput of its 9.6K bit/sec. leased lines. When its customers outgrow an existing line, they install a multiplexer/compressor instead of an additional line. The average payback takes 10 months.

• Litton Computer Services uses a pair of multiplexer/data compressors to support one Harris Corp. printer at 14.4K bit/sec., another Harris printer at 19.2K bit/sec., a Tandem Computers, Inc. CPU at 7.2K bit/sec. and two IBM 3274 controllers and two IBM 3630 card readers at 9.6K bit/sec. — all over one 56K bit/sec. circuit. And Litton still has enough reserve bandwidth to double the existing load.

• Wang Financial Information Services Corp. used to get five 9.6K bit/sec. channels out of its 56K bit/sec. digital lines.

Statistical multiplexer/data compressor devices give the company 15 or more 9.6K bit/sec. channels out of those same lines. Wang expects to save "hundreds of thousands of dollars a year," says Gary Grant, network analyst for Wang Financial Services in New York.

Statistical multiplexers/data compressors — mux/compressors for short — are easy to install, won't disrupt your existing networks and work with any synchronous, bisynchronous or asynchronous protocol. They can be used on conventional analog circuits, high-speed digital circuits — even T1 links — and they are often much less expensive than additional leased lines. More importantly, mux/compressors can significantly reduce telecommunications costs by doubling, tripling or even quadrupling the throughput on your existing data communications circuits.

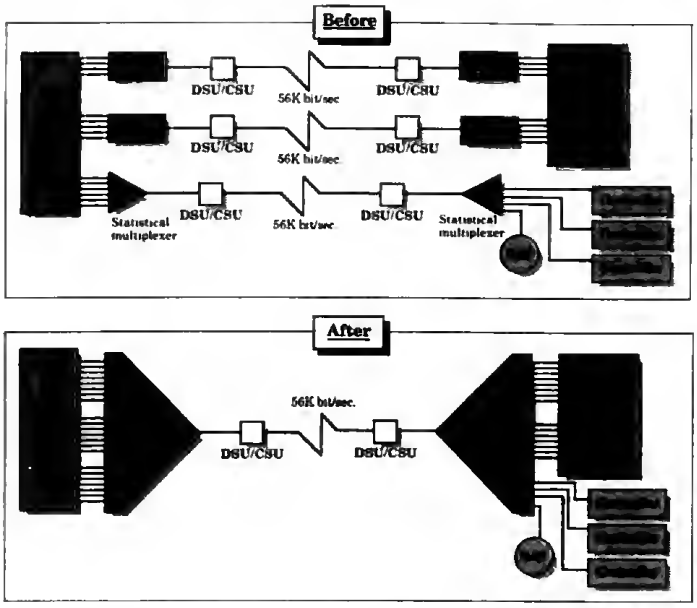
But what exactly are mux/compressors, and how do they do what they do? There are two elements to every mux/compressor:

• Statistical multiplexers combine the inputs from a number of sources into one composite output and increase the probability that the line will be carrying useful information at any given moment. This process is sometimes referred to as data concentration.

• Data compressors are based on the concept that if you can express the same data in fewer bits, you can transmit more data over an existing line. As long as the device on the other end decompresses the data back into its original form and you do not introduce too much delay in the transmission, the whole process is totally transparent to the protocol or network.

Sample data networks

Data compression eliminates multiple lines between sites, reducing leased-line costs



INFORMATION PROVIDED BY SYMPLEX COMMUNICATIONS CORP.
CW ILLUSTRATION: MITCHELL J. HAYES

To illustrate, a 100-character block of data typically requires 800 bits to communicate in either ASCII or EBCDIC code. Various data compression algorithms allow those same 100 characters to be communicated in 400 bits or less. So the 800 bits it took to communicate 100 characters in EBCDIC code could communicate 200 characters if the data is compressed. This 2:1 compression ratio would effectively double the throughput of any existing data communications line.

Low-delay multiplexers

Mux/compressors include low-delay multiplexers, which provide for increased flexibility. You can have an SNA network on one input, bisynchronous on another, Digital Equipment Corp. Decnet on a third and another multiplexer supporting a number of asynchronous terminals in the fourth input.

Each of these inputs will be transmitted reliably over the same high-speed line with a high data compression ratio and full end-to-end data checking on each channel for assured data integrity.

Mux/compressors have proven to be transparent to existing networks. They do not interfere with network protocols. The sending side compresses the entire data stream, including flow control and other protocol-specific characters. Error checking on the receiving side assures that the data stream has been decompressed back to its original form. Since there is no change in the data stream, the mux/compressors do not adversely affect your network's performance.

A mux/compressor device features intelligent multilevel adaptive data compression algorithms, which quickly adjust to the nature of the data being transmitted. You can send an English text file followed by a binary file followed by a Cobol listing followed by a data base transfer followed by a remote bootstrap — and count on the algorithm to adapt and maintain consistently high data compression ratios.

Earl Talen, communications manager for Data-Link, explains how multiplexing complements data compression in his applications. "We work with mortgage banking customers who utilize an IBM 3270 bisynchronous protocol environment. We have the computing facilities here in South Bend and the terminals are located at the customer's site," Talen says.

Increasing efficiency

"The data compression lets us get two 9.6K bit/sec. channels over one 9.6K bit/sec. leased line. Multiplexing lets us use that increased bandwidth more efficiently," he adds.

Talen tells of one customer who is running two interactive cluster controllers and a remote job entry station on a single leased line. He installed a Symplex Communications Corp. Datamizer mux/compressor, which — based on transmission activity and preset parameters — allocates the percentages of available bandwidth for each device.

"The customer is getting better response times than they would get if they had installed an additional line," Talen says. "By saving them the cost of an addi-

One on one: A backup comparison

While statistical multiplexing and data compression technology allows you to connect more devices to existing leased lines, that in turn can increase the potential impact of a leased-line failure.

Darlene Hoffman, technical manager of data communications at Metropolitan Life Insurance Co., had to verify the reliability of backup before installing mux/compressors extensively in Metropolitan Life's IBM Systems Network Architecture network. "One of the concerns of top management was that we would be tying two to three times more users to a single circuit. Failures on such heavily used lines could cause tremendous problems," Hoffman says.

Backup plans can help protect against leased-line failures. The principal mux/compressor vendors provide several options:

• Symplex Communications Corp. offers high-speed dual-autodial backup through the Quantum series of modems for its Datamizer mux/compressors. When the leased line is down, the Quantum modem automatically establishes two dial-up links that enable it to maintain high-speed communications. Symplex claims that the Quantum series can maintain effective speeds of up to 24K bit/sec. over two dial-up lines.

Metropolitan Life uses the dual-dial backup strategy. Hoffman says, "We found that there was virtually no degradation of performance in the dual-dial backup mode. So even when we have had circuit failures, we have been able to maintain operations without interruption."

• Datagram offers an alternative backup strategy through its DM-408 dual-link Steamer, which can be connected to two separate lines. The DM-408 Steamer has two independent multiplexer and data compression modules, each of which has its own internal bus, memory, data compression and I/O circuits.

During normal operations, the two modules share both the available lines through a special circuit that Datagram claims will "assure optimum use of each leased line and guarantee the best possible response time." If one of the leased lines fails, the DM-408 automatically reroutes the traffic through the other line. The network manager can set relative priorities to each of the input ports to minimize the impact of a circuit failure.

Russel Ramey, president of Comlogic, Inc., a communications consulting firm in Great Neck, N.Y., compares the Symplex and Datagram approaches. "The Symplex automatic dial-up capability is a good solution for domestic circuits, especially if a single leased line is sufficient for your needs. I prefer the Datagram solution for international lines," Ramey says. "International lines have a higher rate of failure, and there's no certainty that you will be able to establish two dial-up connections when you need them. The two-leased-line approach is cost-effective so long as you need the combined bandwidth of both lines during normal operations."

LEONARD A. HINDUS

tional line, their mux/compressors paid for themselves in less than a year. Mortgage bankers really appreciate that kind of payback."

If you are leasing more than one line between two points or nearing the capacity limit of an existing line, you should consider the economics of mux/compressors.

You will need a pair of mux/compressors for each line. Mux/compressors for lines up to 16.5K bit/sec. cost about $8,000 a pair. So if you replace a line costing $670 or more a month, the payback period will be less than a year.

Mux/compressors for a 56K or 64K bit/sec. digital circuit can cost $20,000 or more a pair. So if you pay less than $1,700 a month for each line, it may be more economical to add a second circuit. That is, of course, if you can wait until you can get another line installed.

"Both service issues and economics push us toward mux/compressors," Wang Financial Services' Grant says. "If the customer has outgrown the current lines, and you need to satisfy his needs right away, you may have a problem. It will take a while to get a 56K bit/sec. line installed. It also takes a while to order, test and install the hardware to support that line. I can install a mux/compressor, which triples the data carrying capacity of an existing line, in just hours."

And tripling the throughput on a 56K bit/sec. line saves Wang Financial money. For the company, a line from New York to Los Angeles costs more than $5,000 a month. So if mux/compressors — which cost about $20,000 a pair — save the firm from having to install a second line, Grant says, "we realize an immediate savings of at least $40,000 in the first year alone."

T-1 or not T-1, that is the question

There is an enormous gap in the leased-line services currently offered by the common carriers. Right now, if you have more than 64K bit/sec. of data, T1 — at 1.54M bit/sec. — is your next step up. That is quite a gap.

Mux/compression technology fills the gap at a cost per bit that is cost-competitive with T1 service. For example, Datagram, Inc. claims to deliver an effective throughput of up to 168K bit/sec. with its Steamer mux/compressor line. Symplex claims that its new Datamizer II products increase throughput to 224K bit/sec. over a 56K bit/sec. circuit.

A typical 1,500-mile AT&T T1 circuit costs an average of $346,380 per year, not including installation charges. A 56K bit/sec. circuit of the same length costs $40,344 per year. If a pair of mux/compressors boosts the throughput of your 56K bit/sec. line to at least 168K bit/sec., then three 56K bit/sec. lines with mux/compressors will give you a total throughput of more than 500K bit/sec. at a cost of $121,032 a year. That's a savings of $225,348 a year. And even if you need a full 1M bit/sec. of capacity, you can still save $104,316 a year compared with T1 service.

Not only is data compression a cost-effective alternative to T1, but it is an investment you can carry over if you ever install a T1 link. Darlane Hoffman, technical manager of data communications for Metropolitan Life, tested mux/compressors on T1 channels. They functioned exactly as they had on leased lines.

Hindus is an author and principal of Ribbledale Communications, a marketing communications consulting firm based in Hudson, Mass.

Who's who in mux/compressors

The following are brief glances at the principal mux/compressor vendors:

Symplex Communications Corp. is located in Ann Arbor, Mich. Based on market share, Symplex is the leader in the arena; with 4,500 units in the field, the firm claims more of its Datamizers have been installed than all other mux/compressors combined.

Symplex says its new Datamizer II line will produce a typical data compression ratio of 4-1 or greater.

Datagram, Inc. in Boucherville, Que., also offers a full line of mux/compressors. Its Steamer products boast 2-1 to 3-1 data compression with a range of multiplexer and backup options. Datagram reports approximately 1,900 Steamer products installed.

Codex Corp. in Mansfield, Mass., has been offering data compression as an option on its high-end multiplexers for more than a decade.

However, the company has only recently dropped fixed tables in favor of adaptive compression, and it only offers adaptive compression on its 6700 series of products. The firm does not release market share information. Codex claims a 30% increase in throughput due to compression.

LEONARD A. HINDUS

The NEW SmarTerm Family of Terminal Emulators

NEW! SmarTerm 240 version 2.0
Now with precise full screen DEC VT241 color display of ReGIS graphics pictures. In addition DEC VT240 and Tektronix 4010/4014 graphics terminal emulation and DEC VT220, VT102, VT100 and VT52 text terminal emulation. Includes TTY mode and text and binary file transfer.

NEW! SmarTerm 2392
SmarTerm 2392 emulates the popular Hewlett Packard HP2392 text terminal. Use SmarTerm 2392 to access your HP3000 host or Personal Productivity Center. Supports ANSI, EM52, and TTY modes. Includes text and binary file transfer with Kermit and Xmodem error free file transfer protocols.

NEW! SmartMOVE
Combines power, ease of use, error free file transfer and VT100/102 emulation in one "smart" communications software buy.

SmarTerm 220
DEC VT220, VT102, VT100 and VT52 text terminal emulation. Includes TTY mode and text and binary file transfer.

SmarTerm 4014
Tektronix 4014/4012, 4010 and RetroGraphics VT640 graphics terminal emulation with DEC VT102, VT100 and VT52 text terminal emulation. Includes TTY mode and text and binary file transfer.

SmarTerm 400
Data General Dasher D410, D400, D211, D210, D200, and D100 terminal emulation. Includes TTY mode and text and binary file transfer.

All SmarTerm products are available through a dealer near you. For more information about our new family of terminal emulation and communications software respond to the reader service number listed below. Or contact:

PERSOFT INC. 465 SCIENCE DR. MADISON, WISCONSIN 53711 USA
(608) 273 6000 TELEX 759491 FAX (608) 273 8227

persoft

Net managing

FROM PAGE 45

manager Juhan Gottesman, a user from regional Bell holding company Nynex Corp., said that in his six-node network management scheme, it means keeping track of who is connected and fixing what is broken. He said management functions take up 5% of his time.

But Jack Russell, local-area network director of Martin Marietta Corp., said that at his company, "management is not associated with maintenance." Russell suggested gathering network management input from members and putting out a policy statement for people to criticize. "That will make people mad and get a reaction from other network users who need to get involved in helping us define network management needs," he said.

Some attendees expressed anger that their networking problems, management in particular, are not being addressed well by vendors.

"I have 14 [Digital Equipment Corp.] VAXs in a VAX center, an AT&T switch somewhere else with T1 concentrators, four Ethernets and a bunch of other stuff. If you could come up with a scheme to manage that whole thing, I would pay you a good amount — say 10% to 15% of network costs — to do it," Pappas said in a challenge to vendors.

But the vendors sounded just as confused as the users.

In answer to a user's question on how DEC planned to manage host-to-host communications, a DEC representative replied, "I assume you mean Digital host to Digital host." DEC's position, he then explained, is that it will interconnect and interoperate with other vendors to the extent that the other vendors support emerging standards.

While DEC's presentation focused briefly and clearly on present and future cabling and networking scheme plans, AT&T used dozens of complicated slides along with a rapid-fire presentation of its philosophy on everything from traditional voice networking services to future Integrated Services Digital Network systems. AT&T announced that network management functions such as network surveillance, customer control, billing and performance are hot topics today, but was unable to present a currently usable network management solution that addressed all of these areas.

AT&T spokesman Roy Weber came back at users with the suggestion that their companies might need to develop more coordinated strategies for managing their networks.

"Some people plan for the technology, broken into voice or data, some plan the cabling scheme, others pay attention to the costs," Weber stated. "There is not a total picture."

Bridging

FROM PAGE 45

also participate in the project. DEC has agreed to provide a Microvax II system and a complete suite of OSI protocols that work under the VAX/VMS operating system.

Network Research will provide its software products that implement the Defense Department's protocol suite under VMS

The gateways and testing protocols will be accessible over OSInet, an international network system that was designed to be a test bed for products' compliance with and interoperability under OSI protocols.

The Defense Department plans to incorporate the gateways into the Defense Data Network to ensure that users will be able to communicate during the time when some systems have migrated to OSI, while others still use TCP/IP, Mills said.

The Defense Department's latest version of the Government OSI Procurement policy, released in late April, stated that "once the Federal Information Processing Standard [incorporating OSI specifications] is published, government agencies can continue buying non-OSI products for two years, but after that the specifications are mandatory" for all agency networking procurements, Mills said

NEW PRODUCTS

Network management

Communications Sciences, Inc. has announced the **Telecom Manager**, a personal computer software package designed to automate telecommunications operations and order processing.

The Telecom Manager is said to supply instant support data to assist in the management of communications assets.

It consists of multiple interactive modules, including the equipment manager, private-line manager, trouble manager, cable manager, directory manager and bill manager. According to the vendor, the modules provide the necessary tools for managing voice and data equipment, inventories, cost controls and line and equipment troubles.

Prices for the Telecom Manager begin at $9,500.

Communications Sciences, 485 Rt. 1, Iselin, N.J. 08830.

Protocol converters

Case Communications, Inc. has introduced the **8110-A gateway** said to enable Apple Computer, Inc. Apple II and Macintosh computers as well as other asynchronous devices to access IBM host computers.

The 8110-A gateway provides protocol conversion and file transfer for up to eight asynchronous devices. It emulates an IBM 3274 cluster controller unit that links computers and printers to a bisynchronous IBM host or compatible computer. The gateway features a line-tracing function for diagnosing problems in connection lines and offers on-screen Help.

The 8110-A gateway is priced at $2,850.

Case Communications, 7200 Riverwood Drive, Columbia, Md. 21046.

Local Data, Inc. has provided enhanced printer and terminal capabilities on the **Interlynx/5251** protocol converter for connectivity to IBM System/34s, 36s and 38s.

The Interlynx/5251 now allows all currently supported ASCII printers, including Hewlett-Packard Co.'s Laserjet, to emulate an IBM 5219 printer. Also, simple asynchronous devices such as digital weight scales and coin counters can be attached through the computer interface driver on the Interlynx/5251.

The Interlynx/5251 is available in one- to seven-port models and is field-upgradable.

A single-port nonupgradable model costs $1,295. Upgradable models range from $1,450 to $4,750.

Local Data, 2771 Toledo St., Torrance, Calif. 90503.

Electronic mail

ITT Corp. has developed the **Officeaccess for DEC** software package, which is said to allow users of Digital Equipment Corp.'s VAX/VMS office systems to access the worldwide Telex network and other electronic mail systems.

Users of DEC's VMS Mail, All-In-1 and Mass-11 are said to be able to create, send and receive messages. The ITT service automatically performs all formatting, conversion and telecommunications functions.

The package uses an autodial modem, standard asynchronous port and telephone line. Prices for the software license are $1,850 for a stand-alone Microvax system and $2,750 for other VAX models.

ITT, 100 Plaza Drive, Secaucus, N.J. 07096.

Security

Dial-Guard, Inc. has announced its **Dial-Guard** in-line computer security product.

The Dial-Guard system is said to provide computer users' authentication and data protection. The system is composed of a hand-held Dial-Key, host resident software and devices attached to terminals or personal computers. It uses dynamic, one-time passwords and identi-

Continued on page 54

Not every software engineer knows about the new ProKit*WORKBENCH.™

Finally, integrated CASE technology for more accurate results.

Trying to manually develop today's strategic systems without wasting time and money can sometimes be a real shocker.

Now there's new ProKit*Workbench, the premier integrated CASE (computer aided software engineering) tool that fully automates the application of structured techniques for the planning, analysis and design phases of system development. This automation is unique because, with ProKit*Workbench, software engineers need only enter data once for it to be stored and accessible systemwide. Now engineers can experience consistency and completeness like never before, because ProKit*Workbench finally transforms system development into a predictable and repeatable process with accurate results.

ProKit*Workbench offers all this power in a single integrated IBM PC-based software package. And it's backed by McDonnell Douglas, a leader in the field of system development.

Call us at 1-800-325-1087, and we'll give you more information or a demonstration of how ProKit*Workbench can take the horror out of system development.

MCDONNELL DOUGLAS

ProKit*Workbench is available June 1, 1987

Continued from page 53

fies users based on what they know, what they have and where they are.

Custom management and audit reports can be created, and interfaces to real-time message and electronic mail systems are provided. Optional message authentication coding and message encryption are available.

The basic system costs $250 per protected terminal or PC, plus a software interface site license.

Dial-Guard, Suite 140, Building 1, 3000 Sand Hill Road, Menlo Park, Calif. 94025.

Modems/ Multiplexers

Paradyne Corp. has announced its **3400 series** of network diagnostic modems.

The modems are said to incorporate the vendor's custom very large-scale integration circuit design with a digital signal processing architecture called the Universal Signal Processor (USP). Features include an integral two-channel, buffered time division multiplexer and network management diagnostics.

A trellis-coded modulation technique is said to allow the 3400 series modems to operate at speeds up to 19.2K bit/sec. with fallback to 9.6K bit/sec.

Prices start at $8,900.

Paradyne, 8550 Ulmerton Road, Largo, Fla. 33541.

Case Communications, Inc. has introduced the **7126 Time Division Multiplexer.**

The six-channel multiplexer is said to transmit data at speeds up to 56K bit/sec. over digital services such as AT&T's Digital Data Services. It acts as a transmission-line concentrator for both digital and analog modems and as a backbone for other multiplexers. The 7126 also supports voice channels, the vendor said. It is compatible with any synchronous application and is said to be transparent to protocols.

The 7126 costs $1,700.

Case Communications, 7200 Riverwood Drive, Columbia, Md. 21046.

Diagnostic equipment

Data Comm for Business, Inc. has announced its **PL 19.2 Plus** trellis-coded diagnostic modem.

The 19.2K bit/sec. synchronous modem was designed for use on four-wire point-to-point leased lines. It operates over some unconditioned leased lines. Fall-back rates of 16.8K, 14.4K, 12K and 9.6K bit/sec. are supported.

Users may perform diagnostic tests using an asynchronous terminal as a control console. Access can be either local through direct connection or remote through dial-up modems.

The modem costs $6,300.

Data Comm for Business, 807 Pioneer, Champaign, Ill. 61820.

Digilog, Inc. has announced **protocol analyzer** hardware and software for Integrated Services Digital Network (ISDN) LAP-D protocol decode and monitoring, testing, simulation and emulation.

The external interface adapter is for the basic rate that connects any Digilog protocol analyzer to the ISDN S or T interface. It allows protocol decode of user data on either of the two user B channels or testing of the Q.921 Level 2 or Q.931 Level 3 data on the D channel. The interface adapter connects directly to the ISDN interface.

The protocol analyzer products cost $1,000.

Digilog, 1370 Welsh Road, Montgomeryville, Pa. 18936.

Cobling

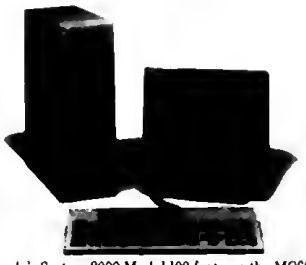
Lutzky-Baird Associates has announced the **LBA Repeater Box**, an amplifier device said to allow Apple Computer, Inc. Macintosh users to double the cable distance between Macintoshes linked by Apple's Appletalk local-area network.

One LBA Repeater Box connects the Macintoshes at the cable distance of 3,000 ft. Each additional LBA box adds about 1,500 ft.

The LBA Repeater Box with two Appletalk cables costs $249.

Lutzky-Baird Associates, #2011, 23801 Calabasas Road, Calabasas, Calif. 91302.

This is Motorola's newest super-microcomputer.



Motorola's System 8000 Model 100 features the MC68020 microprocessor, six-slot VMEbus chassis, high performance disk drives and streaming tape backup for one to eight users. For more information, call 800-262-4488, ext. 746. In California, call 800-252-4488, ext. 746.

UNIX is a registered trademark of AT&T. Available June 1987.
© 1987 Motorola, Inc. Motorola and ® are registered trademarks of Motorola, Inc.

It's smaller. It's friendly. It's fast. Its Unix® V.3 system provides easy access to data, files, and increased productivity.

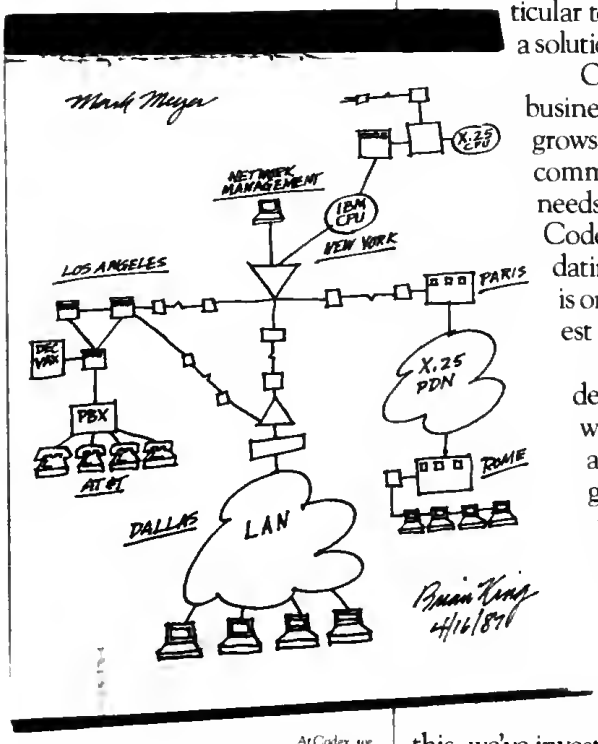
MOTOROLA
Advanced Electronics for a More Productive World.

We're the largest independent networking company. Which is surprising since we've spent the past 25 years merging with AT&T, IBM and DEC.

For over 25 years, Codex has been dedicated to doing one thing well – providing networking solutions to meet any communications need.

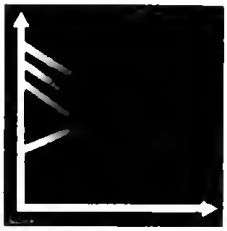
We're not a computer company. We're not a phone company. Data communications is, and always has been, our only business. So we can maximize the performance and functionality of all the pieces of your network, regardless of which vendors they come from.

As a result, our communications solutions are perfect for multi-vendor environments.



At Codex, we don't have set solutions – we work with your current environment. Which is why we spend a lot of time drawing diagrams like this

And since our capabilities include everything from all types of transmission devices to gateways to network management systems, we're never trying to force fit a particular technology into a solution.



We can show you how a Codex network can be more profitable and more productive for your company

Of course, as your business changes and grows so will your communications needs. And, at Codex, accommodating that growth is one of our highest priorities.

In fact, we design our networks so that they actually spark growth within your company – helping to drive it by being a vital and powerful corporate resource.

To do this, we've invested an enormous amount of time and money into R & D. We've also been very active in industry standards committees helping to create the kind of "open architecture" that will allow you to link equipment from many vendors in a more productive way.

All of this is the reason Codex is the preferred brand of data communications professionals. And why 97% of the Fortune 100 use Codex equipment.

Of course, besides working for successful companies we're also backed by a successful company – Motorola.

So if you've got a network requirement and you're looking for someone to help you equip it, expand it, and give you the tools to manage it worldwide, Codex is the company to deal with.

To find out what Codex can do for *your* applications and to order a free copy of our informative guide – *The Basics Book of Data Communications*, give us a call at **1-800-426-1212, Ext. 250.** Or write Codex Corporation, Dept. 707-50, Maresfield Farm, 7 Blue Hill River Road, Canton, MA 02021-1097.

codex
MOTOROLA
The Networking Experts

© 1987 Codex Corporation. Motorola and M are trademarks of Motorola, Inc. Codex is a registered trademark of Codex Corporation. IBM is a registered trademark of International Business Machines Corp. DEC is a registered trademark of Digital Equipment Corp. AT&T is a registered trademark of American Telephone and Telegraph. Codex offices now reach 40 countries worldwide. In Europe call 32 2 660 8482, in Canada 416 794 5700, in the Far East 852 5 890528, in Japan 81 3 5449 2011, in the Americas 617 364 2000.

Visit Codex at NOAC booth #535-41, May 31-June 2

Tandon just expanded the world of compatibility.

70MB

And, all at a price that has become a Tandon trademark. At $3,699*, it's 30% to 40% less than our major competition.

We have just expanded our line of AT-compatible microcomputer workstations with the addition of the powerful PCA-70. With its massive 70MB of Winchester hard disk storage and super-fast access time, even the most complex UNIX® applications and networking tasks are a snap.

When you choose one of the other four Tandon AT-compatibles the values become even more convincing. From the 1.2MB PCA-1 to the 40MB PCA-40, all now come with standard features such as serial and parallel ports, plus 1MB of memory on the system board.

But a low price doesn't mean you have to sacrifice quality. Tandon microcomputers are engineered for performance and reliability by a manufacturer who has been an industry leader for over a decade.

For a Tandon Dealer nearest you, call toll free: **1-800-338-4555.** In California call: **1-800-237-1735.**

Please send me your Tandon Fact Pac, a comprehensive set of literature and product reviews:

Name _____

Position _____

Company _____

Address _____

Telephone _____

Tandon Computer Corporation
405 Science Drive
Moorpark, CA 93021
805/378 6104

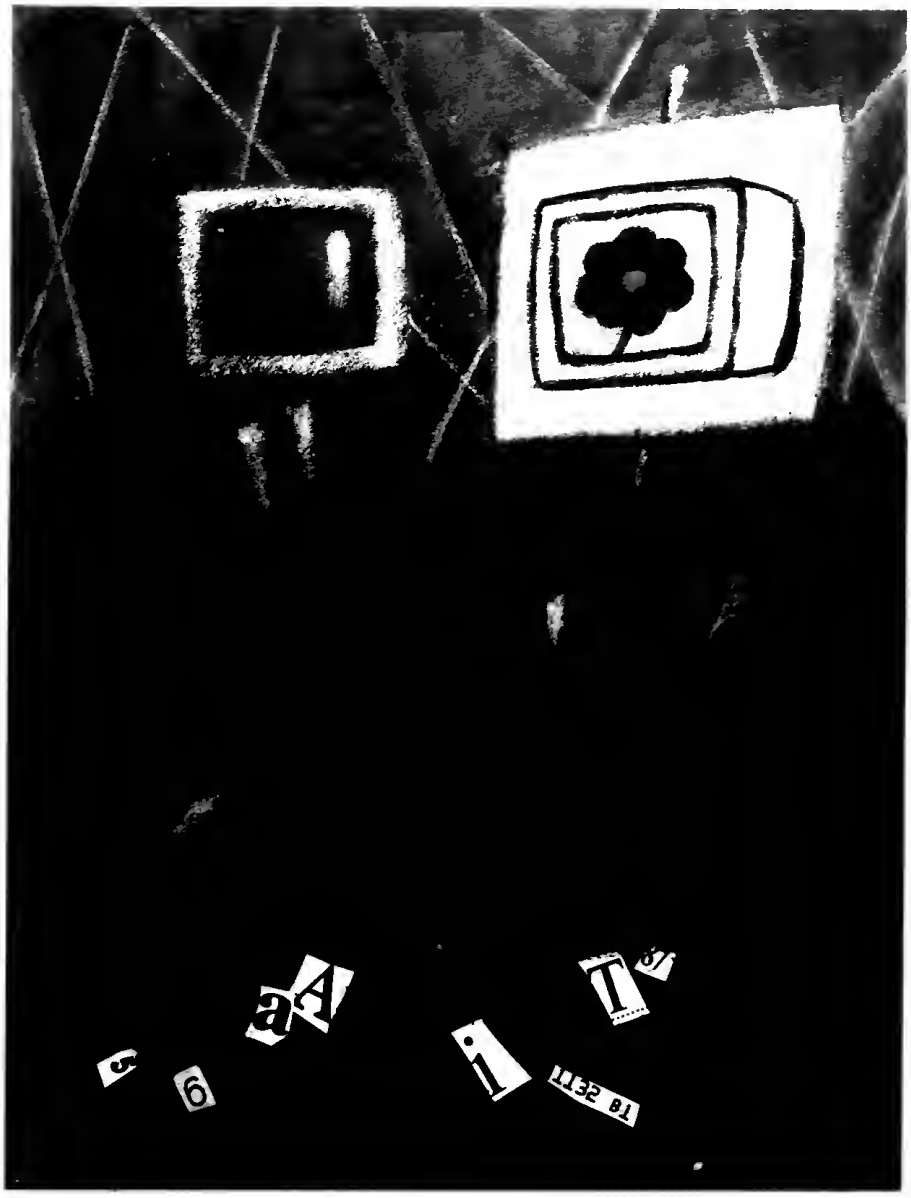
DW 5 25

*Monitor not included. UNIX is a registered trademark of AT&T Bell Laboratories.

Tandon
Price. Selection. Quality.

SPOTLIGHT

PCs — IBM AND COMPATIBLES



Acting like on IBM microcomputer is not as easy as it used to be, but PC compatible makers are putting a good face on the situation and finding comfort in buyer uncertainty.

Power has never looked this good.

The WYSEpc 286.

Now you can get higher speed and higher resolution, together in extremely high style.

The WYSEpc 286 goes from "normal" speed to full 10 MHz throttle – *25% faster than a Personal Computer AT*–with the touch of a switch. A new lineup of graphics monitors lets you choose exactly the display capability you need.

Combine the WYSEpc 286 with the WY-530 monochrome or WY-630 color monitor and get outstanding performance. For enhanced color graphics, move up to the WY-640 EGA monitor. Or, bring CAD and desktop publishing applications into better focus, price-Wyse and pixel-Wyse, with the new WY-700 high resolution graphics display as shown at left.

With the new WYSEpc 286, you can also choose the keyboard that's the best fit: either the standard AT-style, or the IBM Enhanced PC keyboard. And you get the complete compatibility you should expect in every other way, including more than 350 tested off-the-shelf software packages.

Up to 80 Mb of disk storage and eight expansion slots give you everything you need for the most demanding single-user applications, or to anchor the most effective, economical multi-user systems.

And behind this incredible display of power and versatility is a company that ships more terminals than anybody but IBM*.

Write Wyse Technology, Attn: Marcom Dept. 286, 3571 N. First Street, San Jose, CA 95134. Or call toll-free, today, for more information.

Call 1-800-GET-WYSE

WYSE

YOU NEVER REGRET A WYSE DECISION.

*WYSE is a registered trademark of Wyse Technology. WYSEpc 286, WY-640, WY-530, WY-630, WY-700 and the "Y"-shaped design are trademarks of Wyse Technology. IBM and Personal Computer AT are trademarks of International Business Machines Corporation. © 1986 Wyse Technology. *Dataquest 1985 terminal shipment update.*

INSIDE

Interview
Neither Intel's 80386 chip nor IBM's PS/2 family will pose a serious threat to the popularity of 80286-based personal computers, according to Michael Dell of PC's Limited. Page S2.

Who Buys from Whom?
The purchasing department may execute the actual buying, but MIS still selects which PC to buy. Who actually fills the order depends on the size of the company and the need. Page S6.

Generation Gap
The growing family of microprocessors requires users to choose carefully among them in order to obtain the most cost-effective solution for their particular computing needs. Page S7.

Vendor Viewpoint
Often used synonymously, the terms "clone" and "compatible" actually refer to two distinct camps, divided along the lines of price, performance, support and reliability. Page S10.

Ask the Vendor
Some challenging questions about chip glitches, Micro Channel compatibility, slot shrinkage and more. Page S12.

Product Chart
Comprehensive guides to compatibles in the PC XT and AT categories. Pages S15 and S22.

SENIOR EDITOR
Joanne Kelleher
ASSOCIATE EDITOR
Penny Janzen
RESEARCHER
Sally Cusack
DESIGN EDITOR
Marjorie Magowan
ASSISTANT RESEARCHER
Bonnie MacKell

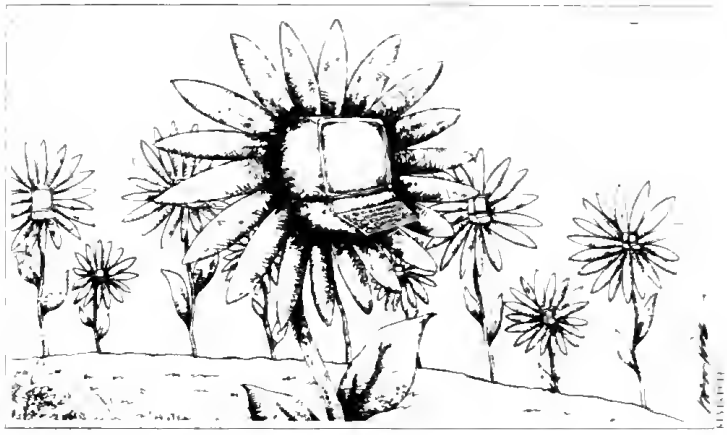
Cover art: Simon Ng

Copyright 1987 by CW Communications/Inc. All rights reserved. Reproduction of material appearing in Computerworld Spotlight is forbidden without written permission. Send all requests to Nancy Shannon, CW Communications/Inc., Box 9171, 375 Cochituate Road, Framingham, MA 01701-9171

The field of PC compatibles and clones is due for winnowing. The hardiest varieties may find fertility in abandoned ground.

LINES SHIFT IN PC FIELD

BY JOHN XENAKIS



Cloning IBM's microcomputers has been a boom business for the past several years, and early indications are that, despite IBM's recent announcement of its Personal System/2, plenty of opportunities still exist both for those who have already staked out claims and for those ready to follow the leader into new terrain. That is not to say that there will not be losers. Some high rollers and many wildcatters are likely to be forced out of the competition, but the change will be more in the nature of a slow squeeze than a radical shakeout.

Right now, for most users and vendors of personal computer clones and compatibles, it is business as usual as everyone tries to figure out how the announcement of IBM's PS/2 family will affect them in the long run.

It appears the IBM announcement was most squarely aimed at the top tier of PC compatible vendors such as Compaq Computer Corp., AT&T, Hewlett-Packard Co. and ITT Corp. (see chart page S5). These are the vendors that try to provide uniquely engineered products from the ground up and that will sell into the corporate enviroment.

These companies are now treading on dangerously contested turf, according to Andy Seybold, chairman of the market research and consulting firm Seybold Group, Inc. in Torrance, Calif. "It's in the corporate environment that IBM has notified everyone that its new machine is what they need for connectivity."

The manufacturers at the top end of the PC compatible spectrum all have new PC designs on the drawing boards, and many of these designs may now have to be scrapped or heavily modified to take IBM's new machines into account. There is no question that a company announcing a product today based on the Intel Corp. 80386 chip would have to address the issue of compatibility with IBM's as-yet-unavailable PS/2 Model 80, which incorporates the 80386 chip. Design modifications might cost that company millions, but not to perform the modification would be to risk the label, "not-quite IBM compatible." Such a characterization spelled big trouble for the first clone makers in the early 1980s.

It is not surprising that the top-level vendors have been extremely closemouthed in reacting to the IBM announcement. AT&T, for example, will make no comment beyond a prepared statement that reads, "We understand what customers require — support of industry standards, connnectivity, open architecture and protection of customers' investment. To the extent that the products announced by IBM meet those requirements, we welcome them."

Not everyone is so reticent, however. Some high-end PC compatible makers are more than willing to discuss the opportunities they say IBM has introduced for them.

"From HP's perspective," says Jim Carlson, marketing manager for HP's Personal Computer Business Unit, "the battle is more technical because of large-scale integration and surface mounting [manufacturing techniques announced by IBM]. In fact, we welcome that, since we're

Xenakis is software editor of *Computer Update* magazine and president of Xenakis Consulting Services, Inc., a consulting firm and software house in Framingham, Mass.

Lines shift

FROM PREVIOUS PAGE

much more technically oriented than many of the other clone manufacturers. If a new announcement can create a new standard, that creates opportunities for us. We feel that will cause a shakeout of some of the other clone manufacturers, who don't have the in-house expertise to meet the technical demands of the new systems."

Carlson emphasizes that many factors influence users' choices of PCs. "The way IBM is approaching the marketplace is to attract people who want to buy from IBM and get their sales and support."

It is a fallacy, though, according to Carlson, that IBM has a lock on all the largest organizations. "Even in the Fortune 500," he says, "some will prefer not to buy from IBM. In fact, the Fortune 500 is very much a mixed-vendor environment — some HP oriented, some DEC oriented, some IBM oriented. What's important to these people is to connect all of these machines together."

"THE Fortune 500 is very much a mixed-vendor environment."

JIM CARLSON
HEWLETT-PACKARD CO.

Tandy Corp. sees little to fear in the new IBM micros. "Tandy is the unsung hero of this marketplace," says Ed Juge, Tandy's director of market planning. "We've been the leader in sales of PC compatibles for over a year. Even with the public knowledge of an impending IBM announcement, our unit sales of PC compatibles were up 62% over the first quarter of last year."

An important part of Tandy's success lies in its dealer network — the Radio Shack Computer Stores. Many people are attracted to Tandy computers because of the readily available sales and support.

According to Juge, IBM's plans do not impact the part of the market in which Tandy is strongest. "Out of 100 Tandy machines sold, only four or five go to the type of company that IBM's announcement is addressing."

Safety in the middle

Technology is less important in the middle tier of PC vendors than it is at the top, although it plays a key supporting role. Vendors in the middle stratum compete on the basis of price/performance and make heavy use of standard technology. But they enhance their products with features — like a smaller footprint or an improved keyboard — that can be promoted in conjunction with price.

"Leading Edge's strategy has always been to take the current technology, improve upon it and make it more affordable for the vast majority of the marketplace," says John Sullivan, a vice-president at Leading Edge Hardware Products, Inc. in Canton, Mass. Sullivan points out that the company's first product included built-in IBM Enhanced Graphics Adapter boards and boards from Hercules Computer Technology, Inc. "Our goal is not to sell to the higher end, but to sell to all levels of the marketplace," Sullivan says.

One improvement that middle-tier PC vendors have been marketing is increased CPU speed. In fact, PC-compatible makers have been waging something of a megahertz war since the introduction of the IBM Personal Computer AT. The first IBM AT ran at 6 MHz (6 million basic operations per second), and recent versions of this product have been running at 8 MHz. Clone makers have been scrambling to claim 8, 10, 12 or even 16 MHz. Some even began marketing dual-speed CPUs, which provide a switch to slow down or speed up the CPU.

IBM's PS/2 announcement, which specifies CPU speeds from 8 MHz for the Model 30 to 20 MHz for the Model 80 (due to be released at the end of the year), will likely spur another volley of competition in this area.

However, since advanced technology is not the attraction at this level, middle-tier vendors are even less affected by the IBM announcement. In fact, Sullivan claims, IBM's recent moves will mean better distribution for Leading Edge. "IBM has definitely segmented the market with their new products and by requalifying and adding new qualifications to their dealer network," he says. "We're going to go after some of the dealers who have had to drop IBM since they can no longer meet its criteria."

Many mid-range PC compatible makers are, in fact, reacting to IBM's new direction as more an abdication than a challenge.

"IBM has really almost officially declared an abandonment of a certain section of the Fortune 2,000," says Marty Strayer, vice-president and general manager of sales and marketing at Epson America, Inc. in Torrance, Calif. "There are an awful lot of people with installed bases of MS-DOS-compatible equipment, including IBM machines, who have been abandoned by IBM," Strayer says. "And there's plenty there for us to direct our attention to. We're not disappointed by what's happened, we're enthused by it."

Larry Metz, executive vice-president at Packard Bell

Continued on next page

INTERVIEW
SURVEYING A RAPIDLY SHIFTING FIELD

At 22, Michael Dell is chairman and chief executive officer of PC's Limited, an Austin, Texas-based mail-order company he founded in 1984 after dropping out of a premed program at the University of Texas at Austin. PC's Limited manufactures its own complete line of personal computers that it sells directly to customers. Last year, the company's revenue totaled just more than $69 million. Dell recently spoke with Janet Mason about the PC compatible market in general and mail order in particular.

What do you expect the PC market to look like in six months?
I think the market will still primarily be purchasing products based on the Intel Corp. 80286 chip. The Intel 80386 chip will find its home in high-end applications and with lunatic-fringe buyers and buyers looking for speed. But the 286 is the most economical way to put power on the desktop today.

But you must expect a substantial market for 80386-based microprocessors, since you recently introduced one of your own.
I expect the 386 to be used in processor-intensive applications as file servers and engineering workstations. It's a very powerful processor engine, and there are a whole variety of uses for 386-based microcomputers that are compatible with Microsoft Corp.'s MS-DOS.

Which microprocessor is currently your biggest seller?
We are primarily selling the 286-based products. Sales are 8-to-1 in favor of the 286 technology. Most corporations are buying 286s, although the entry-level buyer, including individuals and small companies, does not typically buy the 286.

In the next six months, will the 8088-based PCs still have a place in the business market?
They'll have some place. Use of the Intel 8088 chip is certainly declining, but what we will see is a gradual fade-out as users look for more speed. The market is still application driven, and in word processing there are a whole variety of applications for a slow computer. I don't think IBM's announcement will really change whether people buy 8088-class machines.

What type of operating system will come with PC's Limited's 80386-based PC, and will it enable the machine to run multiple 8088 applications simultaneously?
We will sell MS-DOS Version 3.2 as an option, but it won't be standard with the machine. This operating system will not allow the 386 to run simultaneous 8088 applications. There are operating systems like that but we don't offer any at this time.

Will your line of 80386-based microprocessors be compatible with IBM's Personal System/2 line?
This is our own line of 386s, not clones of IBM's PS/2 line. These 80386-based PCs have a bus compatible with the Personal Computer XT and PC AT series from IBM. Our 386s will be compatible with IBM PS/2 to the degree that PS/2, XT and AT are compatible within themselves.

Do you think there will be a large generation of Personal System/2 clones?
I would expect that there would be a few. I don't have any opinions to express as to where these clones might be coming from.

What is the advantage of manufacturing and selling your own line directly?
It affords you advantages over the dealer/sales channel. The primary advantages are that the PCs come from one source, and the dealer's markup is not included in pricing. When you buy an IBM PC, you pay list price, which includes a dealer's markup of approximately 40% as well as IBM's gross profit percentage.

What will be happening on the PC price front in the next few months?
I don't think that our prices will fundamentally change much. As far as the industry goes, I think IBM will put some pressure on people that will spur price cuts. We've seen some of that already. There is nothing inherent in the 386 technology that will lend itself to lower costs, but the prices still may go down.

Will IBM's PS/2 line alter the add-on board market?
We don't sell add-on products for other people's products. We have a whole variety of products we sell that add on and into our computers, but we really don't participate in the add-on market per se.

The add-on market for IBM products consists of small and large companies including AST Research, Inc., Quadram Corp.,

STAN WITSCHONKE

Michael Dell

Novell, Inc., Western Digital Corp., Sony Corp., and many other companies. The add-on market is changing because manufacturers are moving toward positioning computers with more standard features that add-on vendors might otherwise normally supply. For instance, the new IBM product has a video adapter and serial parallel port with every machine. All of the 286 products from IBM have a standard hard disk.

What kinds of customers purchase PCs through the mail?
Most of our customers are medium- and large-size businesses. But we also deal with the whole spectrum of the marketplace including individuals, small, medium and large businesses, government and education.

How will IBM's PS/2 introduction alter the mail-order business?
Only time will tell. There are a whole number of things that interplay in terms of reactions. It's evident that manufacturers that don't control their own technology could be in jeopardy, since they don't have the resources or the wherewithal to develop products that compete with IBM's new line. So that may influence the playing field a bit. •

Lines shift

FROM PREVIOUS PAGE

Electronics, Inc., agrees. "In the short term, our business is excellent," Metz says. "We've looked at all the IBM products and the new specifications, and we can't yet say how long it will take to come up with an equivalent or superior product.

"We feel that the Personal Computer XT marketplace — the lower portion of the marketplace — will still exist and that IBM has virtually abandoned it. When you get into connectivity to mainframes, that's where IBM wants to go, and they're not willing to sacrifice anything. But they've left the other area to us."

The vast majority of today's PC clone vendors are crowded into the low end of the market, in which fallout damage from IBM's actions is expected to be heaviest. It is almost a given that substantial casualties will fall on this bottom tier, where vendors generally use only established technology and compete almost entirely on the basis of price.

"Clone prices for PCs and ATs are going to fall through the floor, and that will affect the revenue stream for most companies, including Compaq and Tandy, but primarily those in the lower tier," Seybold says. "The pressure is on price. Sales won't slow down, but the perceived value of the product line is significantly less."

The types of operations run on this tier vary widely, however — ranging from large manufacturing firms to individuals assembling boxes in their garages — so the impact is not uniform.

John Rossi, president of Blue Chip Electronics, Inc. in Chandler, Ariz., says he is not losing any sleep. "There was a lot of hoopla about the IBM announcement — this business is full of a lot of nervous Nellies. All you have is the basic concept that the computer system has to be compatible with all the existing IBM PC software. That means there are some limits on how far IBM could go," he says.

Rossi is not disturbed by the image of low-end clones as hastily assembled, generic boxes. "Frankly speaking," he says, "I don't know what more you get from any of the other vendors, including ITT, AT&T and Compaq. They do have extra features, but when you boil it down, the users just want compatibility. If you look at companies like Leading Edge, Mitsubishi Corp. and so forth, for the vast majority of applications, they're all the same. The only real difference is the price."

The more things change . . .

Users are still evaluating the situation. The impact of the new technology on their operations probably will not be understood for several months. In fact, the most immediate beneficiaries of IBM's announcements may be consultants.

"My clients are asking how to plan their computer acquisition strategies in light of the new announcement," says Jacqueline Masloff, a Boston-based consultant and trainer. "They're afraid that if they buy now, they'll be locked into obsolete technologies."

Even so, one message is being heard loud and clear: Those who have bought IBM in the past will probably continue to buy IBM, and those who have bought compatibles or clones in the past will continue to do that.

"We've standardized on three computers: IBM, HP and Compaq," says Joseph Wedig, manager of computer services at Hercules, Inc. in Wilmington, Del. "We're impressed with the new IBM PS/2 announcement. We liked it, but we've got to evaluate it against our situation and look at it in terms of, 'What does it mean to us?' There's an issue of the new software on the IBM line. Will we move to the new operating system when it becomes available, or not? I don't know.

"At any rate, I expect that we'll stay with those same three computer vendors," Wedig continues. "It's a function of economics — we buy compatibles for improved price and performance."

City National Bank in Fort Smith, Ark., will follow any direction IBM takes, more because of its unique support requirements than any convictions about IBM's inherent technical superiority.

Mark Alexander, manager of microcomputer selection and support at City National, says, "Now we use mostly IBM. About two years ago, we bought eight Compaq portables, which is one of the best clones, and we've been very satisfied with those. But we also bought three Chameleon computers. Those caused us a problem, since it's hard to buy parts and support for them. Since then we've bought only IBMs."

Alexander attributes his choice of IBM to the fact that he is solely responsible for support. "We have 30 microcomputers here," he says, "and I'm the only one who manages them." Alexander says he plans to continue buying IBM exclusively, mainly because of support issues. "We want to have a standard box so that if someone calls with a problem, you know

> "FOR THE vast majority of applications, [vendors] are all the same. The only real difference is the price."
>
> JOHN ROSSI
> BLUE CHIP ELECTRONICS, INC.

MORE POWER TO YOU FROM

WYSEpc 286

The WYSEpc 286 gives you the highest value in a PC-AT class microcomputer. You get more power, more standard features and better styling.

To begin with, the WYSEpc 286 is based on the 16-bit 80286 processor and runs at a fast 10MHz to out-perform the newest 8MHz IBM PC-AT and many other compatibles by 25%.

Then, look at what is standard on the WYSEpc 286 and typically cost extra on competitors' products: 640K memory, serial and parallel ports, MS-DOS 3.1 operating system with GW-Basic, and a choice of either IBM PC-AT style or IBM Enhanced PC style low-profile keyboards.

And the WYSEpc 286 easily runs the toughest programs, such as Lotus 1-2-3 and Flight Simulator, as well as hundreds of other packages, including Symphony, Wordstar, the PFS series, GEM, Autocad, SCO Xenix, and many more.

MTI is an authorized distributor of WYSE and can give you a demonstration of any of the powerful combinations of the WYSEpc 286. Call today.

The following are registered trademarks: WYSEpc 286 for Wyse Technology, IBM Personal Computer AT for International Business Machines Corporation, Lotus 1-2-3 for Lotus Development Corporation, MS, GW, XENIX and Flight Simulator for Microsoft Corporation, PFS for Software Publishing Corporation, GEM for Digital Research, Inc., Autocad for Autodesk, Inc.

WYSE

MTI SYSTEMS CORP.
A SUBSIDIARY OF DUCOMMUN INCORPORATED
The Computer Experts

Call: 800/645-6530
New York: 718/767-0677, 516/621-6200, 518/449-5959, 212/226-2337 **New Jersey:** 201/227-5552
Massachusetts: 617/270-9890 **Pennsylvania:** 412/931-9351 **Florida:** 813/962-3567 **Ohio:** 216/464-6688, 513/531-0688
Kentucky: 502/499-6656 **Utah:** 801/544-0444 **Illinois:** 312/773-2300 **California:** 818/718-0073, 714/220-6487, 619/268-4740

exactly what hardware they're using.

"Some of the clones you can buy aren't exactly clones," he says. "You can't interchange parts. I've had lots of instances where a computer went down, and I've had the part to fix that computer just because it came out of an old computer, an old IBM."

Will IBM's announcements have an effect on Alexander's strategy? "We think the IBM announcement is very good, although it won't have a big effect on us for two to three years. At that point, it will be more important for a micro to communicate with the mainframe."

"The IBM announcement was old hat," says Patrick Marshall, director of MIS at National Medical Care, Inc. in Waltham, Mass. "I would rather have seen The Beach Boys — at least that would have excited me.

"It was a step backward, closing the architecture," Marshall says. "In fact, all the new stuff, like multitasking, is on the market right now. We've been using Concurrent DOS [from Digital Research, Inc.] for some time, and we have HP Vectras in place. I'm installing 100 PCs over the next year or two with Concurrent DOS. And we're going to be purchasing some ITT systems and hook up a couple of terminals to do some medical software."

> "THE IBM announcement was old hat. I would rather have seen The Beach Boys — at least that would have excited me."
>
> PATRICK MARSHALL
> NATIONAL MEDICAL CARE, INC.

Marshall says he feels IBM has a history of using hardware to lock in users. "I've seen some of my bosses get beaten up by being locked into the 370," he says, referring to IBM's mainframe system. "IBM tried to get you hooked on the 1401 in the '60s, and now they use other hardware to lock you in. People are getting leery of that, and because of that, IBM is locking out whole segments of the marketplace."

Marshall mentions specifically the Open Systems Interconnect (OSI) model for local-area networks developed by the International Standards Organization. "The military and government are forced to support all different kinds of software, and it's all on IBM," he says. "The OSI model gave them such promise for making things easier, and now IBM has abandoned it."

Marshall admits National Medical Care's priorities may differ from other companies'. "We're probably more bottom-line oriented, value oriented, more afraid of getting locked into a technology," he says. "With the machines I'm buying today, I'm saving tons of money. Two years from now, we'll be selling them to our employees for small change. My payback period is so short, I can't afford not to do this."

When a government agency purchases computers, it must observe certain laws governing the acquisition process. This mandate can lead to some interesting results.

"The reason we use compatibles over the IBMs has been the price/performance ratio they give us," says Daniel C. Lyons, manager of office automation at the New York City Department of Correction. "At the present time, we buy only NCR Corp. computers, and we have over 140 systems of the PC, XT and AT types.

"To arrive at a purchasing decision, we did fairly extensive benchmark testing, measuring the compatibility and performance of the different vendors' machines," Lyons continues. "In government, the procurement process involves bidding for an equipment contract, which means that the lowest bidder meeting the specifications is chosen. And since the specs were written against the IBM standard, NCR was the lowest bidder that met or exceeded all of these standards."

That is not an endorsement for NCR, Lyons adds. "In government, the lowest bidder makes the sale, as long as they meet the specifications. Maybe another machine that would have blown away everything else didn't get tested because its price was too high. It's a delicate line. This isn't like private industry where you can identify hardware that's the best in the market and buy it."

The Department of Human Services in Texas had to follow a similar process in its recent purchase of more than 3,000 Packard Bell AT clones. The computers will be networked to Unisys Corp. mainframes to provide on-line data base access for the administration of the state's welfare and food stamps program.

Al Marshall, administrator of the technical evaluation division of the Human Resources department, oversaw the evaluation process that chose the Packard Bell machines. "The decision on the Packard Bell was reached through the State of Texas competitive-bid process," he says. "We drew up a set of business and technical specifications, advertised them, evaluated them and made the award to the machine with the lowest price that met all of the specifications. The specifications in general required that the machine be equivalent to an IBM AT. We wanted the performance capability and the storage of the IBM machine. The specs were

Now on display at your computer dealer: Verbatim subsystem products.

Here's welcome news for PC users who want removable high-capacity storage in a range of sizes. Verbatim 3.3, 6.6, and 12 megabyte subsystems and flexible media.

These subsystems are a perfect match for powerful applications such as CAD, database, spreadsheets, and desktop publishing. Anywhere security, high capacity, transportability, and reliable operation are essential.

Unlike other high-density storage systems, there's never a read-write problem when you move media from drive to drive.

Whether you want a subsystem for use inside or alongside your PC, everything you need for fast, easy installation is part of the package. And you're covered by a full one-year warranty.

Ask your computer dealer about new high-capacity Verbatim subsystems and media. For the dealer nearest you, call 1-800-44KODAK, ext. 990.

PORTRAITS OF A GROWING FAMILY FROM KODAK

© Eastman Kodak Company, 1987

Hierarchy of PC compatibles

	Top tier
Research and development	Spends a lot on R&D to produce unique major products — new architecture and board design, new disk drives, new monitors
Technology	Tries to stay equal to, or ahead of, IBM
Customers	Fortune 500 companies
Brand loyalty	Very high
Market position	Disregards IBM, tries to develop own market strategy, often in conjunction with installed base of other products
Support	Has a comprehensive support program and is supported by numerous third-party support companies, as well as their own service force
Examples	Compaq Computer Corp., AT&T, ITT Corp., Hewlett-Packard Co., Tandy Corp

	Middle tier
Research and development	Takes advantage of generally available technology that is new since the last IBM announcement and spends just enough to add some additional features to come out with an improved product at a cheaper price
Technology	Six to 12 months behind IBM
Customers	Fortune 2,000 companies
Brand loyalty	Moderate
Market position	Bids aggressively against IBM and the high tier by pushing own price/performance advantages along with improved features
Support	Emphasizes support when asked, but it is not as strong as the high tier, and parts may be difficult to get
Examples	Leading Edge Software Products, Inc., Packard Bell

	Bottom tier
Research and development	Spends R&D money on reverse-engineering in order to make exact copies of existing machines
Technology	12 to 24 months behind IBM
Customers	Small business, homes
Brand loyalty	Low or none
Market position	Does not compete in the corporate community, but competes simply on the basis of compatibility and price
Support	Little or no support
Examples	Blue Chip Technologies

CW CHART

written for an IBM AT or functional equivalent. The Packard Bell machine met that set of requirements at the best price that was bid to us."

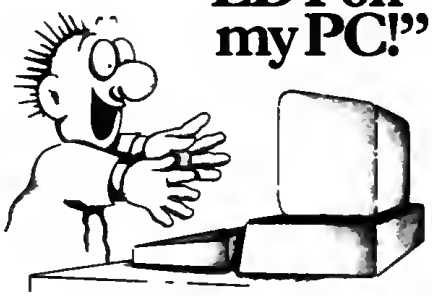
The presence of local support in the form of a value-added reseller also helped to clinch the deal, according to Packard Bell's Metz.

Local roots did not sway the department in another case, however. According to Marshall, Houston-based Compaq was ruled out on the basis of price. IBM was not even considered, he says, because it did not bid on the contract. As to how the announcement of the PS/2 might affect future plans, he says, "It's awfully early to try to assess how the IBM announcement will affect the future without being able to see the real impact of the operating system, OS/2. My opinion is that the IBM announcement has some significance not yet seen.

"I don't think they're going to destroy the marketplace for the AT-class machines that are out there," he continues, "because the relationship that I see right now is one that's somewhat analogous to the initial impact of the AT on the XT-type machines. The AT didn't wipe out that

Continued on page S10

VAX
"EDT on my PC!"



AVAILABLE NOW on MS-DOS, UNIX, ULTRIX-32 and XENIX

With PC/EDT you can use "your editor" on non-DEC systems! Quickly move between VMS, MS-DOS, UNIX and other operating systems without losing productivity!

PC/EDT has full VAX EDT capability...Standard EDT Keyboard Layout...All LINEMODE Commands...Journal and Command Files...User-Defined Keys...Support for Color...Command Macros...and much more!

PC/EDT is only $250. Call us at **(617) 683-7920** and we'll send you more details...or write us at Riverwalk Center, 360 Merrimack Street, Lawrence, MA 01843 Telex 9102405742

Use Your Knowledge . . . Use PC/EDT

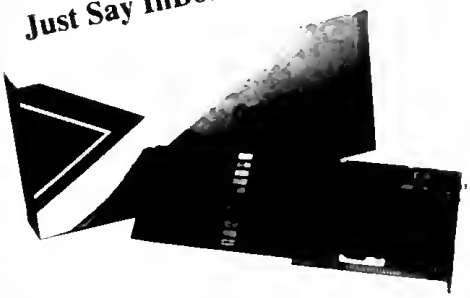
BOSTON BUSINESS COMPUTING, LTD.

The DEC™ Compatible Software Company

VAX, VMS, ULTRIX-32, and DEC are trademarks of Digital Equipment Corporation
UNIX is a trademark of AT&T. MS-DOS and XENIX are trademarks of Microsoft

386 Performance at 1/3 The Price?

Just Say InBoard 386



Intel's InBoard 386 fits right into your IBM® AT or compatible and gives you all the performance of a powerful 386-based system; at a fraction of the cost. Just pop the InBoard 386 into an available expansion slot, connect the umbilical cord and the difference in speed and power becomes readily apparent. Now, time consuming applications like spreadsheet recalcs and CAD screen updates are done in a fraction of the time it took before. With the InBoard 386, response to keyboard commands appear immediately.

Compatability

The InBoard 386 is designed to be compatable with the software you are now using, and will use in the future. The InBoard is happy with all the add-on boards you currently use, including Intel's Above Board. Plus Intel offers a five-year warranty and toll-free technical support line. With InBoard 386, you now have a fast, easy way to upgrade your current AT system without having to scrap your old one.

Desktop Products

Desktop Products has the Inboard 386 and piggyback boards in stock for immediate delivery. Call a Desktop Products representative and find out how Intel's Inboard 386 can beef up your present system.

DESKTOP PRODUCTS

800/433 - 7587

In California 415/428 - 1035

InBoard, Above Board and Intel are trademarks of Intel Corp. ®IBM is a trademark of International Business Machines

Constructing a proper purchasing path

BY JANET MASON

Determining which personal computer to buy can be the least of a large organization's worries. After the decision is made comes a course of tricky hurdles posing questions such as: Which department does the purchasing? Where should the machines be bought? Who will maintain microcomputer strategies?

Mason is a Philadelphia based free-lance journalist and communications consultant specializing in computer technology

Responsibility for the acquisition of microcomputers most often rests with the purchasing department, MIS or both. While purchasing departments traditionally do not possess the technical expertise necessary to handle this task, that situation is changing in many companies.

Purchasing department employees are becoming more knowledgeable about PCs, according to Sojin Lim, purchasing manager at Gentech. Most of the people ordering computers from the New York-based computer retail and mail-order firm are purchasing managers. However, MIS still writes the specifications for microcomputer purchases, Lim says.

Division of power, although a common solution, is not always one that is achieved amicably. "In most large organizations, purchasing PCs is a political battle between the purchasing department and MIS," says Stuart Pastman, a consultant with The Matrix Organization, Inc., a Philadelphia consulting firm.

Even if the purchasing department wins the battle for paperwork control, Pastman says he believes MIS should retain ultimate control of selection. "Any organization that does not have MIS directly handling selection or at least giving its stamp of approval must be wasting a fair amount of money," he contends.

Antonia Bianca, manager of office technology at Pfizer Pharmaceuticals, Inc. in New York, handles purchasing through her department, a large PC-intensive information center. She says this is done not so much to obtain volume discounts but to maintain a unified PC strategy and assist users.

Pfizer buys its micros from dealers to obtain on-site service. When you buy directly from a manufacturer, Bianca says, "you only get a bunch of boxes on the loading dock." As a result, many companies, such as Pfizer, that do not have their own technicians, opt to use value-added resellers instead of other channels.

Selecting the source

Companies usually purchase PCs from one of three sources: the manufacturer's sales representatives, computer retailers or mail-order firms. To some extent, the choice is a function of company size. "Big shops can purchase directly from the vendor and get incredible discounts," Pastman says. Retailers, on the other hand, while they usually cannot handle orders in the thousands, can often offer better deals on purchases of 100 to 200 personal computers a year.

Whether the buyer turns to mail order depends on the criticality of his need, according to Pastman. Few companies buy PCs through the mail because too much can go wrong. Deliveries usually take longer than they would through a local dealer, he explains, and there is a higher probability of defects. "Mail order may have a 10% to 20% dead-on-arrival rate," Pastman says.

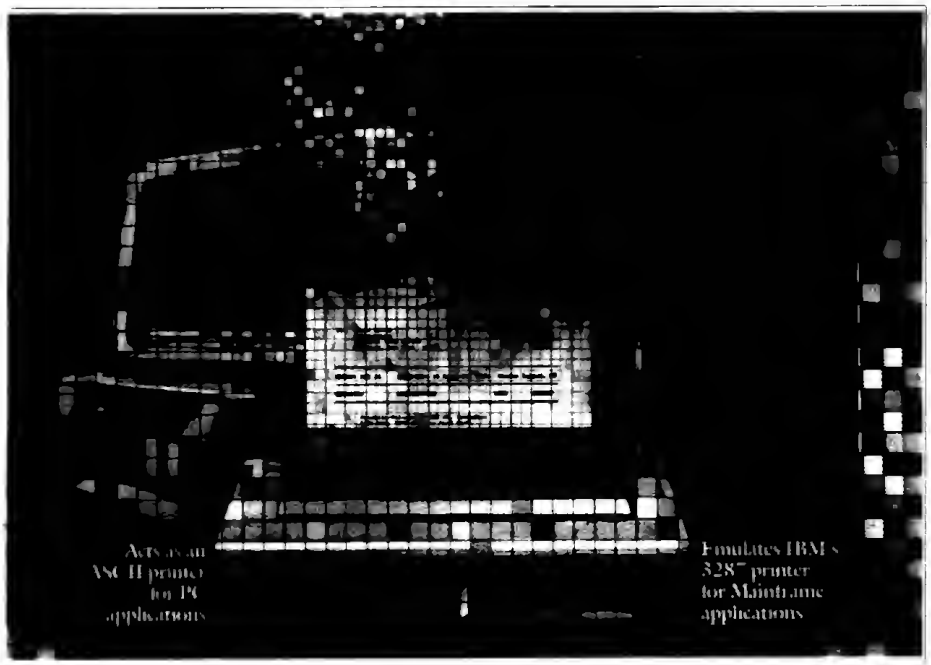
When boxes aren't enough

Bernie Whalen, executive vice-president of the ABCD: Microcomputer Industry Association in Chicago, says computer stores are now focusing on selling solutions — systems and information — instead of boxes. "Not too many computer stores are making money by having their salespersons hang around and wait for customers to come in," he says.

That approach might have worked if expectations of a large home computer market had materialized, according to Whalen. But because that hoped-for bonanza never became a reality, "the need for a storefront to sell PCs like other appliances just disappeared," Whalen says.

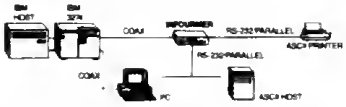
Instead, computer stores are developing expertise in specialized markets such as desktop publishing, government, medical and computer-aided design. Paul Robinson, a salesman with CPL, owner of Entre Computer Centers in the Delaware Valley, found, for example, a lucrative niche as a publishing analyst, selling electronic publishing systems to corporations. He is also developing markets among printers and in-plant print shops.

When dealing with the customer, Robinson speaks directly with the manager of the printing department and addresses the technology from the total business perspective. Robinson observes that the move toward selling systems and solutions puts purchasing directly into the business user's hands. And that, he says, is where it really belongs. •



GIVE YOUR ASCII PRINTER A SPLIT PERSONALITY.

Meet the *Infourmer* from 4G Data Systems. It's a printer adapter with two important character traits. One, it attaches directly to IBM PCs for ASCII printer applications, and two, it emulates the IBM 3287 printer for mainframe applications.



Just think of the possibilities. Now you can access your company's IBM host, preview and work with the data on your desktop PC, and get your printout on any popular, low cost ASCII printer at any remote location. Conversely, you can network the IBM 3287 system without an expensive IBM 3287 printer. Or to put it simply, you can now integrate the same ASCII printer for both PC and IBM or ASCII host applications.

The big advantage of the Infourmer is that it makes more of your ASCII printer capability. Much more. You get more type fonts, faster print rates, higher quality, and quieter operation. And no more waiting for printouts from the basement computer room. You get your hard copy where and when you need it. All for about one fourth of what it costs for an IBM printer.

As specialists in micro-to-mainframe link communications, the Infourmer is precisely the kind of product you would expect from 4G Data Systems. It's our printer adapter with the split personality that brings it all together for you. For more information, call us toll-free **1-800-367-4539**. In New York, call **1-800-223-4539**.

4G DATA SYSTEMS inc

Infourmer is a trademark of 4G Data Systems, inc.
© 1987 4G Data Systems, inc.

Choosing a PC boils down to matching chips with needs

The generation gap is not just an issue for family counselors anymore. Microcomputers have now been around long enough to create their own intergenerational competition. The challenge is to match the right level of chip — the Intel Corp. 8088, 8086, 80286 or 80386 — with the appropriate applications for the most cost-effective blend.

The nature of microcomputing is changing from personal computing to corporate computing on microcomputers, says Stuart Pastman, computer consultant for The Matrix Organization, Inc., a Philadelphia-based consulting firm. "It is not unusual to find a multibillion dollar company that does financial modeling and its corporate budget on a PC," he says.

This type of application would require at least an IBM Personal Computer AT-class microprocessor and, depending on the extent of the data base, may even call for the more powerful generation of computer based on the 80386 chip.

Is the 8088 a dinosaur?

As a result of the need for more powerful microcomputers, the 8088-based microprocessor has become virtually extinct, according to Pastman, who adds that, among his clients, only those operating on very tight budgets are still purchasing them.

According to computer industry analyst and consultant Sandy Weinberg, however, the shift away from the 8088 chip may have at least as much to do with the profit motive as with the technology. Weinberg, founder of Weinberg Associates, Inc. in Glen Mills, Pa., says the advanced generations will be emphasized because they provide computer manufacturers and resellers with wider profit margins than the 8088. The 8088, he adds, is technically a fine chip that remains adequate for many applications.

The strength of the 80386 generation, Weinberg says, lies in large data base applications. The 80386 generation does not improve on such applications as spreadsheets, word processing and financial applications, he maintains. For this reason, Weinberg says, he recently advised three of his Fortune 500 clients to stay with their existing base of 8088 and 80286 PCs for most applications and to purchase 80386-based machines only for heavy data base applications that involve a substantial amount of search time.

Of the installed base of 500 PCs that Antonia Bianca manages at Pfizer Pharmaceuticals, Inc. in New York, 100 to 200 of them are 8088-based. Bianca, manager of office technology, purchased these when the 8088s were first introduced.

With the introduction of the 80286 generation, the company switched to the AT-class machines, which now make up the bulk of its PCs. Bianca does not plan to purchase any more 8088s.

The primary advantages of the AT-class machine are increased speed and storage, according to Bianca. Nearly all Pfizer's employees have their own PCs and are sophisticated users. The 80286-based machines are used for spreadsheets and for downloading financial systems from the mainframe to the PC. Bianca expects the AT-class machine will continue to be her company's standard, with about 10% of the installed base eventually migrating to the 80386. If the company switches to IBM's Personal System/2, "we will probably go with the Model 60 286 with the 44M-byte hard disk," she says.

Speed and power are not the only advantages of the 286 and 386 architectures, according to Pastman. The new operating system being developed to allow multitasking, he says, will not run on the 8088-based machine. "The operating system is not here yet, but companies that invest in the advanced chip generations are buying a future," he says. When software is developed to run on the advanced operating system, he adds, the 8088 will be out of the running.

Executives and power users

Pfizer has "a handful" of 80386-based microcomputers, according to Bianca, which it uses for data base-intensive applications. Since the operating system that would tap the full potential of the machine is not yet available, she says, the only immediate advantage of this generation is the 130M-byte hard disk drive.

In his consulting work, Pastman says, he has seen two types of 80386 users. One, he says, is the corporate executive who wants the best and the fastest — even if it is only to do word processing. The other is the power user with a legitimate business need. Pastman explains that data base applications, huge spreadsheets and corporate modeling, which can take half an hour on the AT-class machine, may take only 10 minutes on an 80386 machine.

While the new generation of microcomputers requires additional investments for most companies, Pastman contends that the faster microprocessors will pay for themselves in salary dollars. "These systems are not a luxury," he says. "They are a cost-efficient way for corporations to operate."

JANET MASON

We knew 25 years ago there would be changes.

Like most, we started out small.

But we planned for changes. And grew fast.

Today, Leasametric is your single-source supplier for every data communications need. And the most stable company in the business.

You'll find brand name PCs, terminals, printers, modems, multiplexers, local area networking capabilities, everything.

Soon, even high-end micro computers. Systems integration. And value-added offerings.

Which gives us the industry's most comprehensive inventory.

And, at Leasametric, you can rent or lease, with finance plans that fit your tax plans. Like long and short-term rentals. And fair-market-value and finance leases. Or you can buy equipment, both new and used.

You get a complete range of services, too. Including on-site maintenance, return to depot programs, time and materials, and more.

So for data communications, think Leasametric. Your single source supplier.

And the only 25 year old in the business.

LEASAMETRIC
Data Communications Division

All the equipment. All the service. All the time.

Northern California & Pacific Northwest 415 574 5707 • Southern California 1 800 638 8574
Rocky Mountains 1 800-638 7854 • Southeast 1 800 241 5641 • Central 1 800 221 4023 • Northeast 1 800 221 0246

IBM'S BIG NEWS AFF

ATTACHMATE INTRODUCES A NEW GENERATION OF 3270 MICRO-MAINFRAME CONNECTIVITY SOFTWARE FOR IBM'S NEW- AND OLD-GENERATION OF PERSONAL COMPUTERS.

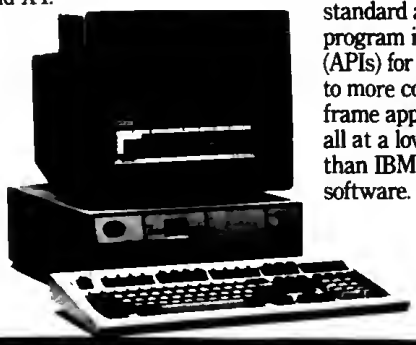
It confirmed our plans.

While the rest of the industry reacts to IBM's® latest news, we're basking in some of the glory.

EXTRA! Connectivity Software,™ our newest product for micro-to-mainframe communications, runs like a charm on the entire new line of IBM PS/2™ computers. And, just like Attachmate's first 3270 emulation products, new EXTRA! runs beautifully on the IBM PC, AT and XT.

Universal connectivity.

EXTRA! micro-mainframe software meets either basic or high-function needs with universal 3270 connectivity. You can keep the same user interface over coax, modems or local area networks using a wide range of hardware adapters from IBM, Attachmate or IRMA.™



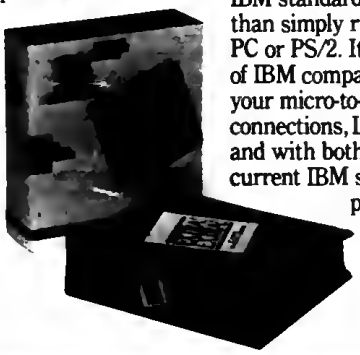
Bluer than blue.

EXTRA! *Entry-level*—An economical entry into Attachmate's superior micro-to-mainframe products. EXTRA! Entry-level offers universal connectivity, file transfer and screen print. And it gives you IBM-standard application program interfaces (APIs) for easy access to more complex mainframe applications—all at a lower cost than IBM's entry level software.

ECTED OUR FUTURE!

EXTRA!—Gives you all the power of EXTRA! Entry-level and much more. Run up to four mainframe sessions at one time, along with a PC-DOS session, windows, and printer emulation. Its universal connectivity and frugal use of memory give you more flexibility than you can possibly get with IBM.

Gateway Options—Attachmate's 3270 Gateway gives you unparalleled flexibility. It makes system configuration easier and it gives you greater control of your network. And Attachmate's Gateway runs on IBM-compatible hardware as well as IBM proprietary hardware.



Graphics Option—Use EXTRA! Graphics to print mainframe images from your PC and turn them into dynamic presentation graphics using popular PC graphics programs like PC Paintbrush®

Discover the EXTRA! advantage.

Attachmate's commitment to the IBM standard means more than simply running on a PC or PS/2. It assures you of IBM compatibility in all your micro-to-mainframe connections, LAN gateways, and with both future and current IBM software programs.

And EXTRA! offers IBM-compatible programming interfaces like HLLAPI, even when it's used with non-IBM hardware—including IRMA.

For details about Attachmate's new EXTRA! and a free copy of our *Quick Reference Guide for Micro-Mainframe Communications*, call

1-800-426-6283.

Attachmate Corporation
3241 118th S.E., Bellevue, WA 98005
(206) 644-4010

Attachmate

Quality Micro-Mainframe Solutions

Copyright © 1987 Attachmate Corporation EXTRA! Connectivity Software is a trademark of Attachmate Corporation IRMA is a trademark of Digital Communications Associates Inc IBM is a registered trademark and Personal System/2 is a trademark of International Business Machines Corporation PC Paintbrush is a registered trademark of ZSoft Corporation

VENDOR VIEWPOINT
All clones are not created exactly compatible

BY PAUL MAHONEY

Clones. Compatibles. What is the difference? The terms are often used interchangeably, but many points of difference exist between the two camps, points that become even more distinct in light of IBM's recent introduction of the Personal System/2 family.

The disparity between the two categories starts with the sourcing and engineering of their respective components, which, in turn, impact other characteristics.

The ready availability of stock parts — chips, boards, power supplies, drives — makes it easy for anyone with some electronics or technical capability to build a clone.

These are the opportunities on which garage industries readily thrive, and they are thriving in Korea and Taiwan. Too often, however, the components used by these foreign clone makers are the seconds rejected by the PC compatible manufacturers.

Unreliable sources of components complicate quality control. If the builder cannot get enough processors or boards from one supplier, he will get the rest from various other sources and possibly be forced to use lower quality chips. This inconsistent quality leaves compatibility questionable.

Compatibles, on the other hand, are constructed from components that are designed by the manufacturer's own engineering staffs and built, primarily in the U.S. and Japan, to the manufacturer's own specifications. Furthermore, PC compatible makers generally possess greater resources for systematic quality control.

Documentation and support are also important points of differentiation. Because they possess more substantial resources, PC compatible manufacturers are able to provide users more comprehensive documentation to accompany their systems and can offer support through dealers or toll-free hot lines. These compatible manufacturers may offer warranties and usually provide an entire family of computers, which gives users several options to meet their needs.

Clones, however, hold some advantages over compatibles. Manufacturers of these systems seek targeted market exposure by providing high-value features. And, since their organizations are smaller than those of PC compatible manufacturers, clone manufacturers can migrate

Continued on next page

Mahoney is vice-president of sales and marketing at Victor Technologies, Inc. in Scotts Valley, Calif

The Magic.

The Facts.

The fact is, companies that use POSTSCRIPT® laser printers are creating some very exciting communications. Quite often, the word magic pops up.

Yet behind this exciting development in business communication, you'll find some hard facts worth serious consideration.

Fact: POSTSCRIPT is the page description language chosen by some of the best names in desktop publishing.

Fact: POSTSCRIPT gives you the option of printing from an IBM PC, Macintosh, or mini/mainframe.

Fact: You won't be tied to a single vendor so you can buy the printer that's best for your company's needs.

Fact: Since POSTSCRIPT is device independent, you can design a document, then professionally print it later at a higher resolution.

Fact: You can choose from hundreds of software programs that support POSTSCRIPT.

Fact: POSTSCRIPT lets you combine text, line art, and even digitized photographs on the same page.

Fact: If you don't ask for a printer equipped with POSTSCRIPT, you won't get the magic behind desktop publishing.

Now that you have the facts, just think what your company can do with the magic. For more facts, give us a call at 415-852-0271.

ADOBE

POSTSCRIPT from Adobe.
The magic behind desktop publishing.

Lines shift

CONTINUED FROM PAGE S5

marketplace. I don't think the new machines will wipe out the marketplace for the AT 286 machines, since those are pretty husky workhorses. The new machines are going to fill some niches and open up some opportunities, but I think the operating system software is going to have as much of an impact on the machine itself."

Postponing imitations

"With its PS/2 announcement, IBM bought itself nine months before it'll be in trouble with a clone," Seybold predicts. "It will take Taiwan or Korea about six months to reverse-engineer the new systems in order to copy them, and then there'll be a copyright infringement suit that'll take three months."

As an indication of things to come, Seybold suggests, "Take IBM's OS/2 brochure and count the number of times that the IBM copyright notice, or something like that, appears. That's going to be a key to how long it will take the clone makers to copy the new systems. You should assume that IBM is going to take a strong legal posture. They're not going to win with that in the long run, but they'll use it to stall and use it as a delaying tactic."

However, according to George F. Colony, president of Forrester Research, Inc. in Cambridge, Mass., the clone makers' problem lies much more in technological terms than legal ones. "IBM has essentially said that if you want to play in this game, you're going to have to make a sizable investment," he says. "In fact, there will be a much more sizable technology investment for anyone who wants to get into the clone business for the new systems. This means that companies like Compaq and Tandy will be all right, but the new technology will knock out the

Continued on next page

All clones

FROM PREVIOUS PAGE

quickly to new technologies.

It is also true that clones enjoy a price advantage. Low overhead in engineering, design and support and less costly parts and construction mean lower prices — prices that compatibles cannot match.

Competition, then, is based on features and price for clones; for compatibles, it is based on quality, reliability, compatibility, documentation and support. For buyers and users, it becomes a question of value.

You can spend less for a clone but risk buying an unreliable machine, one that may not run popular business programs such as Lotus Development Corp.'s 1-2-3. You may get a lot of features, but you may not get documentation to help you run the machine, or if something goes wrong, there may be no one to call

Some good clones out there may be exceptions to these generalities, but it is safe to say that finding them is a little like throwing dice.

In anticipating IBM's announcement of its new products, the industry generally conjectured that the PC giant was out to steamroller the clones and compatibles. Although the announcement will certainly affect manufacturers of both types of systems, IBM has clearly abandoned the low-end of the market (small business users and professional home users), leaving it to the clones and compatibles.

IBM has raised the stakes for clone manufacturers. Its advanced patented features, such as the 32-bit Micro Channel system bus and custom logic chips, cannot be duplicated exactly. As custom integrated circuits become the rule, fewer off-the-shelf parts will be used, and Taiwan garage operations will have a much tougher time.

The differences between compatibles and clones will become more and more pronounced, and only companies with the engineering expertise to design custom parts will survive. Smaller companies will be forced out of the mainstream computer market, and the clones developed through reverse engineering will be out of business.

PC compatible manufacturers also have a tough battle ahead of them, though, as they struggle to bring down prices and still provide high-quality machines with the features sophisticated end users demand

Some PC compatible manufacturers have already lowered prices to coincide with IBM's price drops on the Personal Computer ATs and PC XTs, thereby decreasing the price advantage that clones wield over compatibles but also lowering their own profit margins.

IBM can afford this kind of sacrifice However some of the smaller PC compatible manufacturers will not be able to, and those without solid financial backing could be squeezed right out of the market •

SMALLER companies will be forced out of the mainstream computer market, and clones that are developed through reverse engineering will be out of business.

Lines shift

FROM PREVIOUS PAGE

garage clone makers."

There is no question about it: The new technology and corresponding legal problems provide an impressive array of new barriers that a would-be clone vendor of the new IBM systems will have to overcome. Jeff Bobzin, director of development for compatibility software at Phoenix Technologies Ltd. in Norwood, Mass., lists several of those barriers:

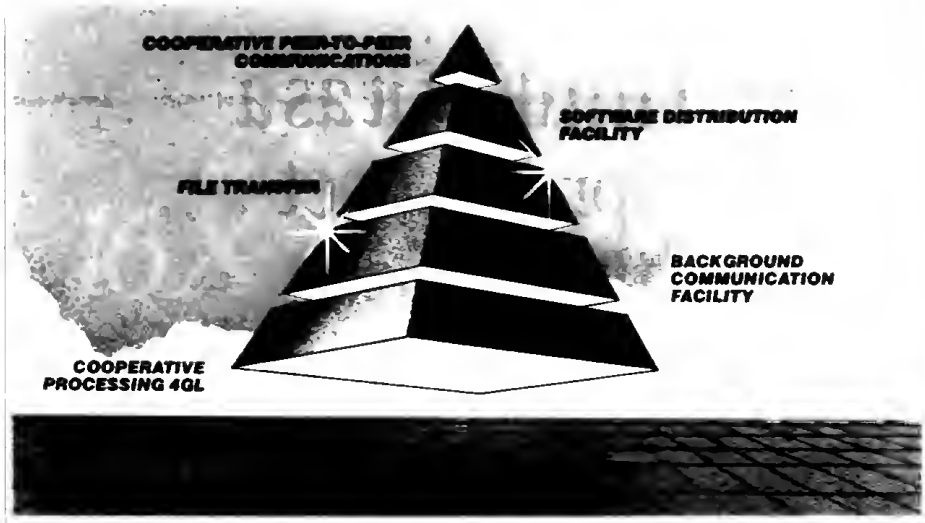
- Legal problems. "There's uncertainty about the legal ramifications of the new systems," Bobzin says. "There are still copyrights, and now there are patents, and, given the delay in the patent process, it will remain unknown for some time."
- The Video Graphics Array graphics chip, which is proprietary to IBM.
- The new bus, the Micro Channel, also proprietary to IBM. "This is something of a concern to the OEMs," Bobzin says, "since there's a whole line of new cards that have to work in that channel."
- The double-size read-only memory (ROM) BIOS, for which clone makers must provide duplicate functionality.
- New manufacturing technologies, surface-mounting, packaging that requires a great deal of increased up-front investment in manufacturing equipment.
- The operating system, parts of which IBM is now developing in-house, which will not be available to clone makers.

These barriers will mean it will cost a clone manufacturer much more than in the past to enter this new marketplace.

Getting down to BIOS

Bobzin is the manager responsible for the development of the clone ROM BIOS at Phoenix. Phoenix has developed a reputation for duplicating IBM's BIOS in a legal manner, and, so far, IBM has not challenged the company in any way. "We've

Continued on page S22



SUPER-LINK™

The First and Last Name in TRUE Cooperative Processing!

At last your on-line, transaction-based system can achieve the efficiency and speed you've been striving for Imagine...

- **35% to 65% reduction in mainframe workload**
- **80% improvement in response time**
- **50% reduction in communications traffic**

All possible with SUPER-LINK™ How?

Cooperative processing is the answer. It turns your PC workstations into shared peer resources, added to the host computer Application segments are processed concurrently on either the PC or mainframe...whichever is more efficiently suited to the task Thus, your PCs do most of the work such as calculations, error processing and forms management, while the host rapidly performs file I/O functions. This maximizes your system's efficiency and minimizes communications time

And only SUPER-LINK™ gives you the capability to build cooperative applications quickly, using its powerful Programmer Toolkit and CPL/I, the world's first cooperative 4GL.

SUPER-LINK™ peer-to-peer applications can run via SNA/SDLC, BSC and/or asynch connection under CICS, TSO, IDMS-DC, CMS and VAX/VMS environments

Want to know more? Use the coupon below to send for more detailed information on SUPER-LINK™ and Cooperative Processing Find out just how good SUPER-LINK™ can make your network look! Contact Donald Wszolek, Multi Soft, Inc., 510 Thornall St., Edison, NJ 08837. Telephone (201) 549-7722

TO
Donald Wszolek
Multi Soft Inc 510 Thornall St Edison NJ 08837

Dear Don
Please send me details about just how good SUPER-LINK™ and Cooperative Processing can make me look

NAME _____ TITLE _____
TELEPHONE # _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Multi Soft, Inc.

Experts in Cooperative Processing Technology

ASK THE VENDOR

The following questions were solicited from users and conveyed to the vendors for responses.

Why didn't Compaq alert users prior to discontinuing support for IBM PC-DOS 3.2? How does Compaq intend to resolve the recently discovered problem with the Intel Corp. 80386 chip used in the Deskpro 386? Also, when will we see an operating system for the 386 that will encompass multitasking and multiuser capabilities?

Arthur Beil
Head of information center
Department of Agriculture's
National Agricultural Statistics Service

COMPAQ COMPUTER CORP. Before Compaq introduced its MS-DOS Release 3.0 Version 3.2 on Feb. 17 with the announcement of the Compaq Portable III, diskettes supporting Compaq hardware using PC-DOS 3.2 were included in the operations guides of our hardware products. We felt this was necessary because of the IBM Token-Ring support PC-DOS 3.2 offered.

Compaq's MS-DOS Version 3.2 now offers that capability. If a Compaq end user still requires support for PC-DOS 3.2, his authorized Compaq dealer can obtain such support through Compaq's service department.

Compaq learned on April 8 that Intel had identified a production problem in the manufacturing of the 80386 microprocessor. This will result in a limited percentage of 80386 microprocessors encountering difficulty when running a 32-bit math function. There is no immediate impact on current Deskpro 386 users, since today's software is designed for 8- or 16-bit operations.

The Deskpro 386 comes with a one-year warranty, and Compaq is still working out the details of a program to address this issue before 32-bit software becomes available and well before the warranty period expires for the first Deskpro 386 purchasers. For a status report on this program, users can call this number: (800) 847-5785.

And, finally, the unique capabilities of the 80386 microprocessor will be provided through extensions to MS-DOS Release 3 this year. These will take advantage of the virtual mode of the 80386, which enables users to run current industry-standard programs concurrently.

IBM's OS/2, which will become available in 1988, will provide protected-mode multitasking for 80286- and 80386-based personal computers. Compaq will supply this to customers through Microsoft Corp.'s OS/2, which is compatible with IBM's standard version of OS/2.

SCO Xenix V/386 from the Santa Cruz Operation (SCO), a multiuser, multitasking operating system based on Unix System V, Release 3 from AT&T, will be available this summer. Compaq has worked closely with SCO to ensure this product will support all the hardware configurations of its 80286- and 80386-based personal computers.

When will an internal modem be available for the IBM Personal System/2 Micro Channel, and is the new Pageprinter, announced last month, only supported for desktop publishing?

Julian Horwich
Executive director
Chicago Association
of Micro Professionals

IBM. An internal modem is available. The IBM PS/2 300/1200 Internal Modem/A provides the capability to transmit data in duplex mode at 300 or 1,200 bit/sec. and supports the Personal Computer AT command set. It is compatible with the Bell 212A and 103 practice (asynchronous only) recommendations for transmitting data over the public switched telephone networks.

The Pageprinter can be purchased separately, but it must be connected to IBM's Personal Pageprinter Adapter Card, which has the necessary intelligence to drive the printer.

It also requires the desktop publishing software or other program instruction to make it work.

We are interested in creating a training videotape for users of our on-line information service. Is there a way to connect a VCR to the audio/video output on the Tandy 1000 in order to create a videotape of the on-line interaction occurring on the monitor?

Dr. John Sandness
Rural Physicians Associates Program
University of Minnesota
Minneapolis

TANDY CORP. According to Radio Shack's Computer Product Engineering Department, this can be done by plugging the VCR into the composite video port on the Tandy 1000. Depending on the VCR used, a cable adapter may be needed to accommodate the RCA Corp. jack used on the Tandy 1000. All stopping and starting of the VCR must be done manually, since the Tandy 1000 is not able to control these functions.

Additionally, the user should hit the F2

Think of it as a spreadsheet that thinks.

Introducing IFPS/Plus with artificial intelligence.

Ask IFPS/Plus a question in plain English "Why, when revenues went up, did net income go down?"

The system uses its artificial intelligence to analyze influencing factors, then gives you the answer in equally plain English

You know what happened and *why* it happened

What's best?

IFPS/Plus solves complex business problems What investments best meet our risk criteria and income goals? What schedule for 2,000 employees maximizes production and minimizes labor costs? Should we borrow or use cash reserves to finance the expansion? Or virtually any other business problem

The models IFPS/Plus uses to solve problems are described in English, not complicated spreadsheet formulas So they're easy to understand

Call for free information.

IFPS/Plus 3.0 is the newest mainframe version of decision software widely used by Fortune 500 companies For our free information packet, call Phil Hand toll free at

1-800-531-5038.

(In Texas and Canada, call 512 346-4980)

EXECUCOM

IFPS/Plus 3.0 runs in IBM TSO and CMS Digital VAX Digital MICROVAX PRIME and selected UNISYS environments
IFPS/Personal is available for IBM PC's and compatibles
Execucom the worldwide leader in decision support software technology for over 12 years

key during boot-up or enter MODE TV at the MS-DOS prompt. This will put the computer in the 40-col., 200-line mode. If you are using a graphics software package, the software also needs to be set for 320- by 200-pixels to accommodate the television display.

Finally, the color-burst signal should be turned on. This is usually done through the software. If the user gets a color picture, then there is no need to change the color-burst setting. All these changes should be done prior to recording.

When will Hewlett-Packard's Vectra be able to boot from an internal 3½-in. drive so that users no longer require a 5¼-in. disk?

Robert Tivey
Director of information systems
Cadwalader, Whikersham & Taft
New York

HEWLETT PACKARD CO. The ability to boot from a 3½-in. disk is a very recent development. If there is a market demand to provide this technology, we will certainly evaluate how best to implement 3½-in. disks on our Vectra product line and make that available to our customers. However, at this time, we cannot say specifically when that capability will be available. In the meantime, we do offer data exchange capability between the HP Vectra and the HP Touchscreen, which has 3½-in. disk drives.

What can users expect from AT&T in terms of a processor based on Intel Corp.'s 80386 chip and 3½-in. disk media? Does the company plan to provide a graphics interface to Microsoft Corp.'s MS OS/2? Further, what role will Unix play, and does AT&T plan to continue support for Microsoft's MS-DOS?

Joel Hartman
Assistant provost for information technologies and resources
Bradley University
Peoria, Ill.

AT&T Customers can expect AT&T to support current and emerging industry standards with state-of-the-art computer hardware, software and networking products. Recently announced AT&T products, such as the AT&T PC 6310, an IBM Personal Computer AT compatible, illustrate this commitment. Other products AT&T will announce this year will also offer strong alternatives to customers seeking standards, compatibility, connectivity, networking and investment protection.

Unix System V will continue to play a key role in AT&T's product offerings. AT&T recently signed an agreement with Microsoft that essentially establishes Unix System V as the standard operating environment for Intel Corp.'s 80386 microprocessor. And AT&T's newest departmental processor, the AT&T Model 3B2/600, is fast becoming one of AT&T's most popular products. The 3B2 is based on Unix System V.

The benefits of smaller and more portable systems are somewhat offset by a decrease in the number of expansion slots that are available for customizing applications.

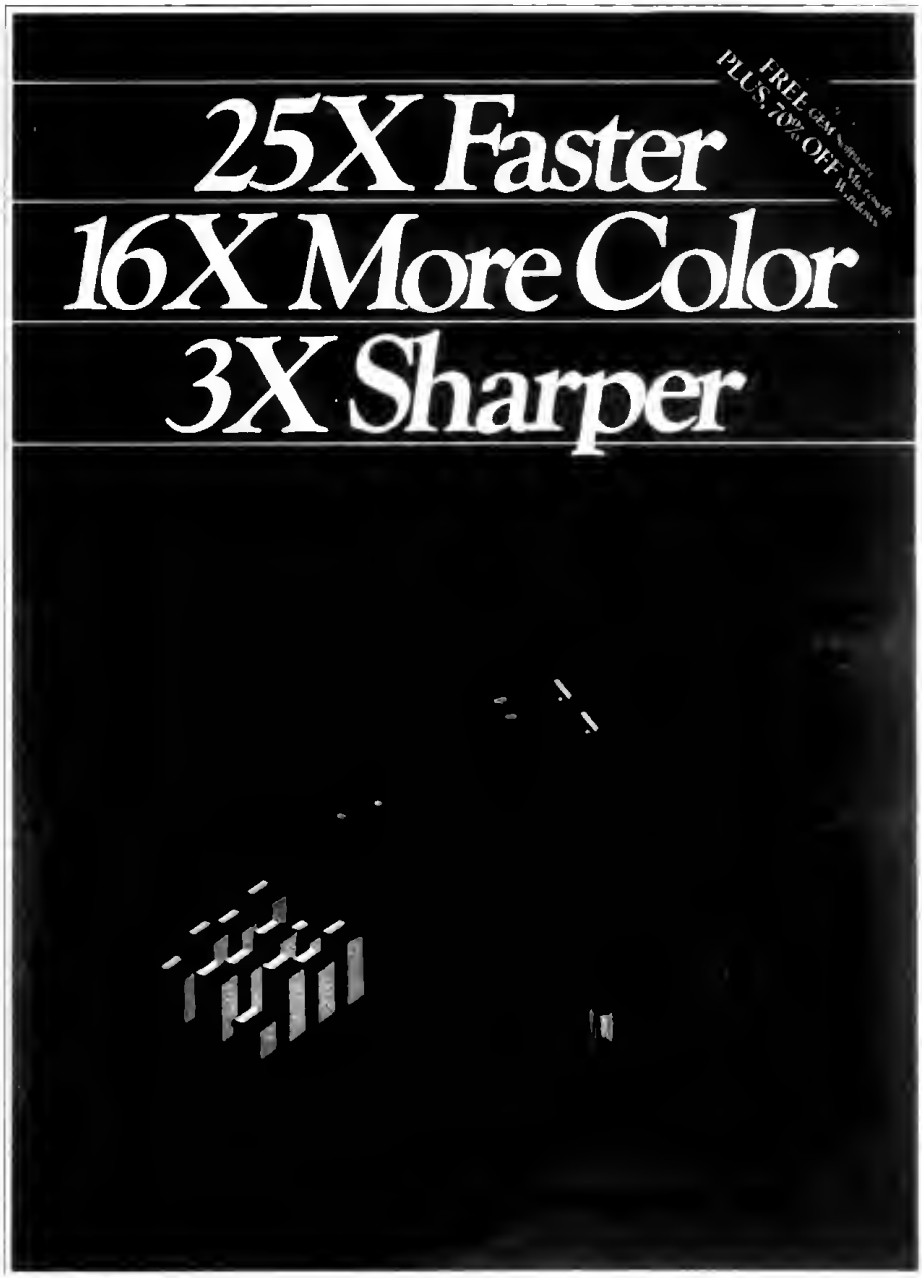
Where does Compaq stand on this issue, and what is Compaq's position regarding providing IBM Micro Channel compatibility for its machine that is based on Intel Corp.'s 80386?

Stuart Cox
Project engineer
Kentucky Fried Chicken Corp.
Louisville, Ky.

COMPAQ COMPUTER CORP. Compaq's newest and smallest personal computer, the Compaq Portable III, comes standard with a parallel interface, a serial interface and a red-green-blue color monitor interface. It can internally incorporate such features as memory (up to 6.6M bytes) and communications (an internal modem is an option) that often take up expansion slots. This computer also offers two full-size 16-bit expansion slots with the addition of the optional Expansion Unit that snaps onto the back of the unit. In designing the Portable III, we feel we have provided the required level of functionality yet kept the size of the system as small as possible. We have not yet introduced a laptop because the functionality compromises that must be made with current technology do not meet the needs of the majority of serious business users.

The Micro Channel expansion bus that IBM introduced with its Personal System/2 will not accept existing plug-in boards, including modems, various local-area network boards and high-resolution display controllers. IBM is today the sole supplier of Personal Computer peripherals to customers who go with the new IBM products. The bus offers 32-bit capability in the 386-based IBM machines, but this feature will not be useful for the foreseeable future. In fact, its advanced display capability is an 8-bit architecture. None of the other peripherals IBM announced use the 32-bit capability either. The industry-standard 16-bit bus will continue to meet the broadest set of needs in the PC market.

Where 32-bit power is needed is in the memory bus of 386-based machines. A 32-bit memory bus is a critical ingredient to the performance of the Deskpro 386. Up to 10M bytes of random-access memory are accessible through the 32-bit bus. The larger bus can rapidly transfer information to and from the 80386 microprocessor and does not place any artificial constraints on the microprocessor. This performance-matching allows for optimum system performance •



BLUE

The Genicom IBM compatible printers. More than IBM. For less.

[illegible] IBM [illegible] Presenting the [illegible] 3500 [illegible] series [illegible] 4500 [illegible] printers. [illegible] compatible [illegible] IBM. And designed to work [illegible] with IBM 3270 cluster [illegible] IBM 34, 36, 38 [illegible]

[illegible] these printers are so true [illegible] operate them with [illegible] IBM manual.

So what's the difference [illegible] The Genicom 3500s [illegible] 4500s are faster. And packed [illegible] features. All for up to [illegible] less than what you'd [illegible] IBM. So why pay more for [illegible]

Printers That Beat The Blues.

[illegible] speed and versatility [illegible] able dot matrix printer, you can depend on the Genicom 3500 series.

Select from four models. And get printing at double the speed of IBM up to 400 cps data processing and 120 cps letter quality.

[illegible]

King of the Blues.

For heavy duty [illegible] Genicom 4500 series [illegible] through drafts of 800 [illegible] minute. Then shift [illegible] speed, letter quality [illegible] high resolution graphics [illegible] course, Genicom offers [illegible] 4500 series options [illegible] bar code printing.

Like all its products, Genicom stands by the 3500s and 4500s with an international service [illegible] Giving you the full support [illegible] America's largest independent printer manufacturer.

So when it's time to choose the perfect printers for your IBM system, don't settle for second best. Color them blue [illegible] with Genicom.

For more information [illegible] nearby Genicom distributor [illegible] 800 437 7468 [illegible] 703 949 [illegible]

The Printers That Mean Business

IBM Personal Computer AT compatibles

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Acer Technologies, Inc. (408) 922-0333	**Acer 910**	**80286**	**MS-DOS**	**512K bits-1M byte**	**1.2M bytes**	**NA**	**6, 10 selectable**	**8**	**—**	**—**	**16.15 x 15.78 x 5.9**	**From $1,895**
	Acer 1100	**80386**	**MS-DOS**	**2M bytes**	**360K bits-1.2M bytes**	**40M-130M bytes**	**4.77, 6, 8, 10, 12, 16 selectable**	**8**	**2**	**1**	**21.0 x 17.0 x 6.5**	**Contact vendor**
Advanced Computer Products, Inc (714) 558-8822	Advantage-Sharp 7501	80286	MS-DOS	512K bits-1M byte	1 2M bytes	User-defined	6 8 selectable	8	1	1	21 3 x 17 3 x 6 6	$1 299
Advanced Logic Research (714) 581-6770	**PC2/AT**	**80286**	**MS-DOS 3.2**	**512K bits-1M byte**	**1.2M bytes**	**NA**	**8, 10 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,545**
	Dart 012	**80286**	**MS-DOS 3.2**	**512K bits-1M byte**	**1.2M bytes**	**NA**	**12**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,595**
	A Part 286	**80286**	**MS-DOS 3.2**	**512K bits-2M bytes**	**1.2M bytes**	**NA**	**8**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,495**
	A Dart Basic	**80286**	**MS-DOS 3.2**	**512K bits-2M bytes**	**1.2M bytes**	**NA**	**10**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,995**
	Access 386	**80386**	**MS-DOS 3.2**	**1M byte**	**1.2M bytes**	**40M bytes**	**16**	**6**	**2**	**2**	**21.3 x 17.3 x 6.8**	**$5,699**
Afton Computer, Inc (714) 553-1611	286 Turbo	80286	MS DOS 3 1	512K bits-1M byte	1 2M bytes	0-115M bytes	8 10 selectable	8	2	1	21 3 x 17 3 x 6 8	$1 276
	Advantage 386 Compatible	80386	MS-DOS 3 2	512K bits	1 2M bytes	0-115M bytes	16	8	0	0	21 3 x 17 3 x 6 8	$3 295
Alphanumeric International, Inc. (213) 921-8689	**ANI PC-AT**	**80286**	**MS-DOS**	**640K bits**	**360K bits-1.2M bytes**	**20M-130M bytes**	**8, 10, 12 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,349**
American Computer & Peripheral, Inc (714) 545-2004	American 286-A	80286	—	512K bits	1 6M bytes	NA	6 6 selectable	8	0	0	21 3 x 17 3 x 6 6	$1 995
American Micro Technology (714) 731-6800	**AMT 286**	**80286**	**MS-DOS**	**640K bits**	**User-defined**	**User-defined**	**8, 10 selectable**	**8**	**0**	**0**	**21.3 x 17.3 x 6.8**	**$699**
	AMT-386	**80386**	**MS-DOS**	**512K bits-4M bytes**	**User-defined**	**User-defined**	**16**	**8**	**0**	**0**	**21.3 x 17.3 x 6.8**	**From $2 499**
American Research Corp (800) 423-3877	ARC 286 Turbo Model 12	80286	ARC MS-DOS 3 2	360K bits 1 2M bytes	1 2M bytes	20M 50M bytes	6 25	8	0	0	21 3 x 17 3 x 6 8	$1 925
	ARC 386	80386	ARC MS-DOS 3 2	512K bits	1 2M bytes	40M bytes	16	8	1	1	21 3 x 17 3 x 6 8	$5 154
Apparat, Inc. (303) 799-0819	**Apparat 80**	**80286**	**MS-DOS**	**640K bits**	**1.2M bytes**	**30M bytes**	**6**	**6**	**1**	**2**	**21.3 x 17.3 x 6.8**	**$2 603**
Artificial Technology (415) 490-9344	AT System	80286	MS-DOS 3 2 GW Basic	256K bits	1 2M bytes	20M-40M bytes	10	8	2	1	21 3 x 17 3 x 6 8	$75
AST Research, Inc. (714) 863-1333	**AST Premium-286 Model 80**	**80286**	**MS-DOS 3.1**	**512K bits**	**1.2M bytes**	**20M bytes**	**6, 6, 10 selectable**	**7**	**1**	**1**	**19.25 x 16.5 x 6.25**	**$1,995**
	AST Premium-286 Model 90	**80286**	**MS-DOS 3.1**	**1M byte**	**1.2M bytes**	**NA**	**6, 8, 16 selectable**	**7**	**1**	**1**	**19.25 x 16.5 x 6.25**	**$2,495**
	AST Premium-286 Model 120	**80286**	**MS-DOS 3.1**	**1M byte**	**1.2M bytes**	**20M bytes**	**6, 8, 16 selectable**	**7**	**1**	**1**	**19.25 x 16.5 x 6.25**	**$2,995**
	AST Premium-286 Model 140	**80286**	**MS-DOS 3.1**	**1M byte**	**1.2M bytes**	**40M bytes**	**6, 6, 16 selectable**	**7**	**1**	**1**	**19.25 x 16.5 x 6.25**	**$3 495**
	AST Premium-286 Model 170	**80286**	**MS-DOS 3.1**	**1M byte**	**1.2M bytes**	**70M bytes**	**6, 8, 10 selectable**	**7**	**1**	**1**	**19.25 x 16.5 x 6.25**	**$3 995**
Atronics International Systems, Inc (408) 942-3344	ATI 6/12 1 Wait	80286	MS-DOS 3 2	1M byte	1 2M bytes	NA	12	8	0	0	21 3 x 17 3 x 6 8	$2 395
	ATI 6/8 1 Wait	80286	MS DOS 3 1	640K bits	1 2M bytes	NA	6 8 selectable	8	0	0	21 3 x 17 3 x 6 8	$1 575
AT&T Information Systems (201) 898-1333	**PC 6300 Plus**	**80286**	**MS-DOS 3 1, Unix System V, Release 2 0**	**512K bits**	**360K bits-1.2M bytes**	**20M bytes**	**6**	**7**	**1**	**1**	**21.3 x 17 3 x 6 6**	**$2,340**
Baby Blue Computer Systems Inc (415) 636-1401	Baby Blue 16	8088 2	MS-DOS	256K bits	360K bits	NA	4 77 8 selectable	0	1	1	19 0 x 14 0 x 5 0	$449
Baby Micro, Inc. (303) 790-7718	**Junior-286**	**80286**	**MS-DOS**	**512K-640K bits**	**1.2M bytes**	**NA**	**6, 8, 10, 12 selectable**	**6**	**1**	**1**	**—**	**$1,299**
	Baby-286	**80286**	**MS-DOS**	**512K bits-1M byte**	**1.2M bytes**	**NA**	**6, 8, 10, 12 selectable**	**6**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,299**
BAK (617) 756-3320	PC AT Clone	8086 2	MS-DOS	1M byte	1 2M bytes	30M bytes	8 10 selectable	8	2	1	21 3 x 17 3 x 6 8	$2 295
	386	80386	MS-DOS	1M byte	1 2M bytes	40M bytes	16	8	2	1	21 3 x 17 3 x 6 8	$4 494
Basic Time, Inc. (408) 727-0877	**Basic Time AT**	**80286**	**MS-DOS**	**640K bits-2M bytes**	**1 2M bytes**	**44M bytes**	**6, 8, 16 selectable**	**6**	**2**	**1**	**21.3 x 17.3 x 6 6**	**$1,595**
Bentley Computer Products (512) 250-9897	Bentley-286-10	80286	MS-DOS	512K bits-1M byte	1 2M bytes	NA	6 10 selectable	8	0	0	21 3 x 17 3 x 6 8	$1 036
	Bentley 286-8	80286	MS-DOS	—	1 2M bytes	NA	6 8 selectable	8	0	0	21 3 x 17 3 x 6 8	$995
Bi-Tech Enterprises, Inc. (516) 567-8155	**Long Island PC/AT II**	**8086-2**	**MS-DOS 3.2**	**640K bits**	**360K bits-1.2M bytes**	**20M 140M bytes**	**6, 10 selectable**	**6**	**1**	**1**	**16.5 x 19.5 x 6.5**	**$1,765**
	Long Island PC/AT	**8086-2**	**MS-DOS 3.2**	**1M byte**	**360K bits-1.2M bytes**	**20M-140M bytes**	**6, 10 selectable**	**8**	**1**	**1**	**16.5 x 21.5 x 6.5**	**$1,765**
	Long Island PC/AT 386	**80386**	**MS-DOS 3.2**	**512K bits**	**360K bits**	**20M 170M bytes**	**15**	**6**	**1**	**1**	**16.5 x 21.5 x 6.5**	**$2,785**
Bloatax Systems, Inc (818) 442-0020	BPK-0002	80286	MS-DOS	256K-640K bits	360K bits	NA	—	0	0	0	13 0 x 13 0 x 7 0	$425
Bondwell Industrial Co. (415) 490-4300	**Bondwell 6**	**8088**	**MS-DOS 3.3**	**512K bits**	**720K bits**	**NA**	**4 77**	**0**	**1**	**1**	**11 0 x 12.2 x 3 1**	**From $1295**
Britek (408) 727-8587	Britek-AT Turbo	80286	MS-DOS	512K bits	1 2M bytes	20M bytes	6 10 selectable	8	0	1	21 3 x 17 3 x 6 8	$1 375
Canon USA, Inc. (516) 488-6700	**A-200 EX**	**80286**	**MS-DOS 3.0**	**640K bits**	**1 2M bytes**	**20M-40M bytes**	**6**	**6**	**1**	**1**	**21 3 x 17 3 x 6 8**	**$3 795**
Cantech (415) 791-7091	Cantech Turbo-286	80286	MS-DOS 3 1 3 2	1M byte	360K bits-1 2M bytes	40M bytes	8 10 selectable	8	2	1	21 3 x 17 3 x 6 8	$1 995
Carterfone Communications Corp. (214) 630-9700	**Carterfone Model 286**	**80286**	**MS-DOS 3.2**	**640K bits**	**360K bits**	**30M bytes**	**8**	**6**	**1**	**1**	**21 3 x 17 3 x 6 8**	**$2 995**

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors

Now Computerworld puts a powerful new research tool right at your fingertips.

Computerworld's new SearchLink service gives you easy access to more than 800 databases in just minutes!

There's a wealth of useful information being gathered on electronic databases every day. But getting access to it hasn't been easy. What databases have the answers you need? How do you get access to them?

The answer is SearchLink. SearchLink gets you answers to all kinds of questions that are important to your business. You can get competitive information, or details about new products and services, or market facts, or the latest FCC regulations. You can get information on computers, finance, business statistics, investments, law and much more. Everything from accounting to trademarks to history or geography.

SearchLink offers you easy access to the services of leading database vendors including BRS; Dialog; NewsNet; SDC; VU/TEXT; and Questel, to name just a few. All you need is a credit card and a computer with modem.

All this, and more, with just one call!

SearchLink is easy.

No subscriptions. No passwords. All you do is call 800-843-7337 with your modem. Have your major credit card ready, and within a few minutes you'll be cleared to use SearchLink. Simple instructions tell you how to go after the information you need.

Using SearchLink is as easy as knowing what you want to find out. You pick the subject; SearchLink shows you what's available. Then you pick what you want to see.

If you know which database you want to access, SearchLink lets you specify that. If you're not sure, SearchLink can choose the database(s) to search.

SearchLink is inexpensive.

Considering that you could easily spend hundreds of dollars worth of your time with conventional research methods and still not get what you want, SearchLink could be the biggest bargain going. SearchLink costs only $7.99 per topic searched (a few databases carry surcharges), plus 25 cents per minute connect time, and $2 per abstract you choose to see. You can even get hard copies if you want them.

SearchLink provides 24-hour on-line assistance.

If you get into trouble, just type "SOS" and a real, live search specialist will come on-line to answer your questions.

Here's just a small sample of the databases you can access through SearchLink. A complete list is available on-line on SearchLink.

We can't list all of SearchLink's more than 800 databases, but just to give you an idea, here are *some* of the databases available under the topic "COMPUTER."

Business Software Database
Software Packages for Minis and Micros
COMPENDEX®
Engineering and Technology Information
Computer Database
Computers and Telecommunications
COMPUTERPAT
U S Data Processing Patents
INSPEC
High Technology Topics
Menu—The International Software Database
International Software Listings
Microcomputer Index
Business, Education, and Home Computer Topics
Online Microcomputer Software
Software Descriptions and Reviews
SUPERTECH
AI, CAD/CAM, Robotics, and Telecommunications

And here are just a few of the other popular databases you can access with SearchLink:

ABI/INFORM
Business and Management Topics
Chemical Abstracts
Index of Chemistry Articles
Disclosure
(Selected Databases)
Donnelley Demographics
U S Census Information
Dun & Bradstreet
(Selected Databases)
ERIC
Educational Topics
PTS PROMPT
Business and Market Information
Standard and Poor's Corporate Descriptions
Information on U S Corporations
Trademarkscan
Active U S Trademarks
TRINET
Information on U S Companies

Here are some of the major database vendors accessible through SearchLink:

ADP Network Services
BRS Information Technologies
Data-Star
Datasolve Information Online
DataTimes Information Network
Dialog Information Services, Inc
G-Cam Serveur
NewsNet, Inc
Pergamon InfoLine
Questel Inc.
SDC Information Services
VU/TEXT Information Services

Call 800-843-7337 now!

Put the power of knowledge to work for you right now. Call 800-843-7337 (THE-SEER) on your computer and get the answers you need to stay ahead.

SEARCHLINK
From Computerworld
Your link to the world of information

COMPUTERWORLD
A CW Publication
An International Data Group Company

For more information about SearchLink BY VOICE dial 617 879 0700

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Cascade Electronics, Inc (507) 645-7997	AT-Compatible System	80286	MS-DOS 3.2	512K-1M bits	360K bits-1.2M bytes	20M-30M-40M-80M bytes	6-10	8	1	1	Standard	$1,195
Century Micro Systems (714) 666-2233	CMS-AT Series	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	NA	6-8 selectable	6	1	1	[illegible]	[illegible]
	CMS 1300 Series	80286	MS-DOS 3.2	640K bits-1M byte	1.2M bytes	NA	6-8 selectable	6	0	1	[illegible]	[illegible]
Chicago Computer Connection, Inc. (800) 422-2666	CCC 386C	80386	MS-DOS 3.1	1M-4M bytes	1.2M bytes	NA	4.77-8-10-16 selectable	8	0	1	21.3 x 17.3 x 6.8	$2,995
	CCC ATC	80286	MS-DOS 3.1	640K bits-1M byte	360K bits	NA	6-10 selectable	8	0	1	21.3 x 17.3 x 6.8	$999
Clone Factory (213) 477-0447	AT-Clone	80286	MS-DOS 3.2	640K bits	1.2M bytes	20M bytes	8-10 selectable	8	1	1	[illegible]	[illegible]
Clone Technologies, Inc (913) 469-0400	Clone AT 1800	80286	MS-DOS 3.2	1M byte	1.2M bytes	30M bytes	10	8	0	1	21.3 x 17.3 x 6.8	$1,595
	Clone AT-1	80286	MS-DOS 3.2	640K bits	1.2M bytes	30M bytes	6-8 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,495
	Clone AT-1	80286	MS-DOS 3.2	640K bits	1.2M bytes	NA	6-8 selectable	8	0	1	21.3 x 17.3 x 6.8	$949.50
Club AT, Inc (415) 490-2201	Club-10 MEG-0 Wait State	8086	MS-DOS 3.1-3.2	512K bits	1.2M bytes	NA	8-10 selectable	8	2	1	[illegible]	[illegible]
	Club-10 MEG-1 Wait State	8086	MS-DOS 3.1-3.2	512K bits	1.2M bytes	NA	10-8	8	0	0	[illegible]	[illegible]
	Club 286	80286	MS-DOS 3.1-3.2	512K bits	1.2M bytes	NA	7.2	8	0	0	[illegible]	[illegible]
Columbia Data Products, Inc. (305) 774-1111	Violin-ATC	80286	MS-DOS 3.2	512K bits	360K bits	20M-120M bytes	8-8 selectable	12	1	1	21.3 x 17.3 x 6.8	$2,300
Comark Corp (312) 351-9700	Tatung TCS-7000 Turbo series	80286	MS-DOS 3.1	640K bits	1.2M bytes	20M-130M bytes	6-8-10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,900
Compaq Computer Corp. (713) 370-0670	Deskpro 286 series	80286	MS-DOS, Basic 3.1, 3.2	256K bits-2.1M bytes	1.2M bytes	0-80M bytes	8, 12 selectable	7	—	—	—	$2,999-$4,999
	Portable III series	80286	MS-DOS	640K bits-6.6M bytes	1.2M bytes	0-40M bytes	8, 12 selectable	2	—	—	16.0 x 9.8 x 7.8	$3,999-$5,799
	Portable II series	80286	MS-DOS	256K-640K bits	360K bits-1.2M bytes	0-20M bytes	8, 8 selectable	2	—	—	17.7 x 13.9 x 7.5	From $2,999
	Deskpro 386	80386	MS-DOS, Basic 3.1, 3.2	1M-10M bytes	360K bits-1.2M bytes	40M-130M bytes	16	5	1	1	19.8 x 16.5 x 8.4	$6,499-$8,799
Competitive Computer Components (800) 443-9834	Professional AT	80286	—	1M byte	360K bits	30M bytes	40	8	0	1	21.3 x 17.3 x 6.8	$1,887
	Enhanced AT	80286	—	1M byte	1.2M bytes	NA	6-10 selectable	8	0	1	21.3 x 17.3 x 6.8	[illegible]
	Enhanced 386	80386	MS-DOS	1M byte	360K bits-1.2M bytes	NA	16	8	0	1	21.3 x 17.3 x 6.8	$2,499
	Advanced 386	80386	MS-DOS	1M byte	360K bits-1.2M bytes	30M bytes	16	8	0	1	21.3 x 17.3 x 6.8	$1,149
Compuadd (512) 250-1489	Standard 88 Turbo	8088	MS-DOS	256K bits	360K bits	NA	4.77-8 selectable	8	0	0	—	$395
Compucorp (213) 306-2626	Connection 80286	80286	Concurrent DOS	640K bits	1.2M bytes	20M-40M bytes	8-10 selectable	8	2	—	[illegible]	Contact vend
Computer Age, Inc (203) 724-5100	Computech AT	80286	MS-DOS 3.1	640K bits-1M byte	1.2M bytes	NA	6-6.7-8 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,595
Computrade, Inc (408) 435-2662	Novas 286 AT	80286	MS-DOS 3.1	640K bits	—	NA	8-10 selectable	8	0	1	[illegible]	$46
Computer Classified, Inc. (800) 331-5150	CCI ST/386	80386	MS-DOS 3.2 Xenix Novell	640K bits-12M bytes	1.2M bytes	NA	16-2	8	2	1	19 x 16.4 x 6.2	$3,195
	CCI ST/286-12	80286	MS-DOS 3.1 Xenix Novell	640K bits-3M bytes	1.2M bytes	NA	12-7	8	1	1	19 x 16.4 x 6.2	[illegible]
Computer Components Corp (800) 843-7012	CCC 365 AT	80286	MS-DOS 3.2	1M byte	1.2M bytes	NA	6-8 selectable	8	—	1	[illegible]	[illegible]
Computer Creations, Inc (513) 836-5707	Business System AT	80286	—	1M byte	1.2M bytes	NA	6-8 selectable	8	0	1	21.3 x 17.3 x 6.8	$946
Computer Direct (512) 836-7260	Computer Direct 286-10	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	6-10 selectable	8	—	—	[illegible]	[illegible]
Computerland Corp (415) 639-2025	BC 286	80286	MS-DOS 3.2	512K bits	NA	NA	6-8 selectable	8	2	1	16.25 x 16.25 x 6.25	$2,895
Computer Library (415) 659-8784	10 MHz Plus AT Compatible	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	8-10 selectable	8	1	—	[illegible]	NA
Computer Mail Order (800) 233-8950	CMO-PC Too-AT	80286	MS-DOS 2.1	512K bits	1.2M bytes	NA	8-10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,019-$1,199
Computer Products United (800) 824-2936	CPU AT 286-10	80286	MS-DOS 3.1	512K bits	1.2M bytes	20M bytes	8-10 selectable	8	1	—	[illegible]	[illegible]
	CPU Mini 286-8	80286	MS-DOS 3.1	512K bits	1.2M bytes	20M bytes	8	—	1	1	[illegible]	[illegible]
Computer Systems (313) 779-8700	Rugged PC/86	80286	MS-DOS 3.2 Unix	—	360K bits-1M byte	NA	8-10 selectable	—	1	1	21.3 x 17.3 x 6.8	$1,900
	PC/86	80286	MS-DOS 3.2 Unix	640K bits-2M bytes	360K bits-1M byte	NA	8-10 selectable	—	1	1	21.3 x 17.3 x 6.8	$1,500
	PC 386 series	80386	MS-DOS Unix	1M byte	360K bits-1M byte	40M-144M bytes	12	8	1	1	21.3 x 17.3 x 6.8	From $3,900
Continental Peripherals Unlimited (818) 282-3121	Super IAT	80286	MS-DOS 3.2	1M byte	360K bits-1.2M bytes	30M bytes	6-8 selectable	8	1	1	[illegible]	[illegible]
Cordata Technology, Inc (805) 375-1500	AT D-Desktop Computer	80286	MS-DOS 3.1	640K bits	1.2M bytes	NA	8	6	1	1	21.3 x 17.3 x 6.8	$1,895
	AT D-AQ-20	80286	MS-DOS 2.1	640K bits	1.2M bytes	20M bytes	8	6	1	1	21.3 x 17.3 x 6.8	$2,395
Core International, Inc (305) 997-6055	Atomizer	80286	MS-DOS 3.3	1M byte	1.2M bytes	43M bytes	8	8	—	—	21.3 x 17.3 x 6.8	$1,[illegible]
Data Dynamics (800) 351-7832	Data Dynamics Computer	—	MS-DOS 3.2	1M byte	1.2M bytes	NA	—	8	0	1	21.3 x 17.3 x 6.8	$1,150
Data General Corp (800) 343-8842	Dasher 286 Intelligent Workstation	80286	MS-DOS 3.1-3.2	640K bits-8M bytes	1.2M bytes	0-20M bytes	6-10 selectable	8	—	1	[illegible]	[illegible]

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Data-Lite Systems (805) 584-9104	DL-386	80386	MS-DOS 3.2	1M byte	1.2M bytes	40M bytes	18	7	1	1	21.3 x 17.3 x 8.8	$3,295
	DL 286	80286	MS-DOS 3.2	640K bits	1.2M bytes	20M bytes	6, 8 selectable	8	1	1	21.3 x 17.3 x 8.8	$1,425
Digital Equipment Corp Contact local sales office	Vaxmate	80286	MS-DOS 3.1	1M-3M bytes	1.2M bytes	0-20M bytes	8	2	2	0	16 x 15.5 x 11.5	$4,045
80 Microcomputer Service, Inc. (518) 393-2494	80 Micro 286-8+	80286	MS-DOS 3.2, GW-Basic	512K-640K bits	1.2M bytes	40M bytes	8	8	1	1	21... x 17.3 x 6.8	$2,495
	80 Micro 386-14	80386	MS-DOS 3.2, GW-Basic	640K bits	1.2M bytes	40M bytes	14	6	1	1	—	$4,695
	80 Micro 286-12 Plus	80286	MS-DOS 3.2 GW-Basic	512K bits	1.2M bytes	40M bytes	12	8	1	1	21.3 x 17.3 x 8.8	$2,695
Eastern Enterprises, Inc (213) 725-3080	Enterprise AT	80286	MS-DOS 3.2	640K bits	1.2M bytes	30M-82M bytes	8, 10	8	1	1	Standard	Contact vendor
Electro-Design, Inc. (619) 471-0680	IMP 286 TC	80286	MS-DOS 3.2, 3.3	640K bits	360K bits	30M bytes	18	8	1	1	—	$3,995
	IMP 286-161	80286	MS-DOS 3.2	512K bits	360K bits	30M bytes	16	—	—	—	Standard	$3,995-$4,695
Eltech Research, Inc (408) 943-1764	ELT 286-8	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	8	0	0	21.1 x 17.9 x 6.4	$995
	ELT 286-8 Plus	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	8	2	1	21.1 x 17.9 x 6.4	$1,175
	ELT 286 System	80286	MS-DOS	512K bits	1.2M bytes	NA	6, 10 selectable	8	0	0	21.1 x 17.9 x 6.4	$1,024
	ELT 286-10 Plus	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	8	2	1	21.1 x 17.9 x 6.4	$1,325
Epson America, Inc (213) 539-9140	Equity III PLUS	80286	MS-DOS 3.2	640K bits-15.5M bytes	1.2M bytes	0-40M bytes	6, 8, 10 selectable	9	1	1	19.6 x 17.4	$2,495-$3,495
Everex Systems, Inc (415) 498-1111	System 1800 Plus	MS-DOS, Xenix, Unix, Novell	512K bits-1M byte	360K bits	270K bits-1.2M bytes	0-133M bytes	8, 10 selectable	8	0	0	Standard	Contact vendor
Falcon Systems, Inc (312) 541-3933	AT System-Tatung	80286	MS-DOS 3.2	640K bits	360K bits	30M-40M bytes	10	8	1	1	21.3 x 17.3 x 6.8	$2,500
Five Star Computers (800) 752-5555	Five Star 286/10	80286	MS-DOS 3.1, 3.2	640K bits	360K bits-1.2M bytes	30M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,695
	Five Star 286	80286	MS-DOS 3.1	640k bits	360K bits	NA	6, 10 selectable	12	2	2	—	$1,295
47th Street Photo (800) 221-7774	Maxum 286 Turbo	80286	MS-DOS 3.2	640k bits-1M byte	1.2M bytes	24M bytes	8, 12 selectable	8	0	0	21.3 x 17.3 x 6.8	From $1,095
GEMS Computers (408) 988-0161	GEMS Computer GAT	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	6, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	$975
	GEMS AT Monochrome System	80286	MS-DOS 3.1	1M byte	360K bits-1.2M bytes	20M bytes	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,550
Grid System Corp (415) 961-4800	Grid 286	80286	MS-DOS 3.2	640K bits-2M bytes	720K bits	10M bytes	4, 77, 8 selectable	0	1	1	14.0 x 12.0 x 3.0	$3,850
Gulfstream Micro Systems, Inc (305) 994-6500	GMS Sat 386	80386	MS-DOS 3.2 Xenix	760K bits-3M bytes	1.2M bytes	10M-140M bytes	14	8	0	0	19.6 x 16.1 x 5.5	$4,565
	GMS Sat 286	80286	MS-DOS 3.2	1M byte	1.2M bytes	10M-140M bytes	10	8	0	0	19.6 x 16.1 x 5.5	$2,299
Hewlett-Packard Co. (800) FOR-HPPC	HP Vectra PC	80286	MS-DOS, PC DOS	640K bits-6M bits	360K bits-1.2M bytes	20M, 40 bytes	8	7	1	1	18.7 x 15.4 x 8.3	Contact vendor
	HP Vectra PC	80286	MS-DOS 3.1	640K bits	360K bits-1.2M bytes	40M bytes	8	4-7	1	1	16.7 x 15.4 x 6.3	$3,099-$4,795
Honeywell Bull, Inc (617) 893-6000	PC AP	80286	MS-DOS 2.1	256K bits-4M bytes	1.2M bytes	20M-60M bytes	8	8	1	1	21.18 x 16.54 x 6.14	$3,565
Imperial Computer Corp (818) 285-1256	Mini AT System	80286	MS-DOS	512K bits	1.2M bytes	—	12	—	0	0	21.3 x 17.3 x 8.8	$1,290
	Turbo AT	80286	MS-DOS 3.1, 3.2	256K-1M byte	—		4, 77, 6, 10, 12 selectable	8	—	—	—	Contact vendor
	IMP 007	80286		512K-1M byte	1.2M bytes		6, 10, 12 selectable	8	—	—	—	$1,240
Indtech, Inc (408) 743-4300	Indtech 5191	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	8, 10 selectable	12	0	0	21.3 x 17.3 x 6.8	Contact vendor
	Indtech 5170	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	12	0	0	21.3 x 17.3 x 6.8	Contact vendor
Industrial Computer Products (817) 356-7500	Pro PC AT Turbo	80286	MS-DOS 3.2	1M byte	1.2M bytes	20M-170M bits	6, 10 selectable	8	1-8	1-2	18 x 21 x 6	$1,595-$5,700
Information & Technology Services, Inc (800) 642-2395	ITS Turbo 286 AT	80286	MS-DOS 3.1	512K bits-1M byte	360K bits	44M bytes	6, 8, 10 selectable	8	2	1	—	$1,195
	ITS System 386	80386	MS-DOS 3.1	512K bits	360K bits-1.2M bytes	40M-133M bytes	18	8	1	1	—	$3,995
Innovative Technology Ltd. (800) 253-4001	Affordable AT	80286	MS-DOS	256K bits-1M byte	1.2M bytes	0-100M bytes	6, 8, 10 selectable	8	0	0	21.3 x 17.3 x 17.3	$1,099
Intelligent Data Systems, Inc (213) 633-5504	PC 286	80286	MS-DOS	512K bits-1M byte	360K bits-1.2M bytes	0-180M bytes	6, 10 selectable	8	1	1	21.25 x 17.5 x 6.0	$1,895
Intelligent Micro Systems Corp (800) 824-4031	IMS-286	80286	MS-DOS 3.2	512K-640K bits	1.2M-2M bytes	20M-70M bytes	10	8	0	0	20.0 x 16.0	$1,035-$1,145
	IMS-286/TEM	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	8	0	0	21.0 x 16.0	$1,035
International Systems Marketing, Inc (301) 670-1813	ISM Express 286 RGB	80286	MS-DOS 3.2	640K bits-8M bytes	360K bits-1.2M bytes	0-160M bytes	6, 10 selectable	8	1	1	19.0 x 18.0 x 8.5	$4,095
Intronics Computer Corp. (800) 422-3366	Master Series AT/12	80286	MS-DOS, PC DOS, Unix	1M byte	1.2M bytes	0-300M bytes	6, 12 selectable	8	0	0	21.3 x 17.3 x 8.8	$1,845
	Master Series AT/10	80286	MS-DOS, PC-DOS, Unix	1M byte	1.2M bytes	0-300M bytes	6, 10 selectable	8	0	0	21.3 or 19.8 x 17.3 or 16.1 x 6.8 or 5.5	$1,295

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Ivy Microcomputer Corp. (617) 863-8914	**DT-20**	**80286**	**MS-DOS 3.1**	**512K bits-14M bytes**	**1.2M bytes**	**20M-160M bytes**	**6, 8, 10, 12 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,695**
	DT-40	**80286**	**MS-DOS 3.1**	**512K bits-14M bytes**	**1.2M bytes**	**40M bytes**	**6, 8, 10, 12 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,995**
	DT-80	**80286**	**MS-DOS 3.1**	**512K bits-14M bytes**	**1.2M bytes**	**80M bytes**	**6, 6, 10, 12 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$2,495**
	Portable 2 series	**80286**	**MS-DOS 3.1**	**512K bits-14M bytes**	**360K bits**	**20M-80M bytes**	**8**	**8**	**1**	**1**	**18.0 x 14.0 x 9.0**	**$2,795**
JC Infor Systems Corp (415) 659-8440	JC Lips	80286	MS-DOS	512K-1M bits	360K bits-1.2M bytes	20M-80M bytes	8-10	8	2	1	—	Contact vendor
Joy Systems, Inc. (408) 435-0900	**JS-286 series**	**80286**	**MS-DOS, PC-DOS**	**512K bits-1M byte**	**360K bits-1.44M bytes**	**0-133M bytes**	**6, 10 selectable**	**8**	**0**	**0**	**21.3 x 17.3 x 6.8**	**From $1,695**
Kaypro Corp (800) 4KAYPRO	Kaypro 286 I series	80286	MS-DOS	640K bits-16M bytes	1.2M bytes	40M bytes	10	8	1	1	21.25 x 17.0 x 6.24	$1,995-$2,995
Leading Edge Hardware Products, Inc. (617) 828-8150	**Model D2**	**80286**	**MS-DOS**	**640K bits-1M byte**	**—**	**30M bytes**	**6, 8, 10 selectable**	**6**	**—**	**—**	**15.5 x 16.0 x 6.1**	**$1,936-$2,914**
Lee Data Corp (800) LEEDATA	Series 80	80286	MS-DOS	640K bits-1M byte	1.2M bytes	20M-40M bytes	10	8	2	1	21.0 x 16.5 x 6.6	From $3,995
Lolir Corp. (214) 234-8032	**Lolir 386**	**80386**	**MS-DOS 3.3**	**640K bits-16M bytes**	**360K bits-1.2M bytes**	**30M-120M bytes**	**18**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**From $2,695**
	Lolir 286	**80286**	**MS-DOS 3.2**	**640K bits-1M byte**	**360K bits-1.2M bytes**	**20M-120M bytes**	**10**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,600**
Lucky Computers (214) 690-6110	G AT	80286	MS-DOS	1M byte	360K bits-1.2M bytes	30M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,995
MAD Intelligent Systems, Inc. (408) 943-1711	**MAD D3000**	**80386**	**MS-DOS, PC-DOS, Unix System V.3, Xenix, Venix, Concurrent DOS**	**1M-16M bytes**	**—**	**85M bytes**	**—**	**8**	**4**	**1**	**16.25 x 17.0 x 6.10**	Contact vendor
	RDDS 3000 AI Workstation	**80386**	**MS-DOS, Unix System V.3**	**4M-16M bytes**	**—**	**85M bytes**	**16**	**8**	**—**	**—**	**16.25 x 17.0 x 16.25**	Contact vendor
	MAD D2000	**80286**	**MS-DOS, PC-DOS, Unix V.3, Xenix, Venix, Concurrent DOS**	**1M byte**	**—**	**NA**	**10**	**8**	**4**	**1**	**18.25 x 17.0 x 6.10**	Contact vendor
Magitronic Technology, Inc (718) 706-7670	AT System 1000	80286	MS-DOS 3.2	1M byte	1.2M-4M bytes	0-20M bytes	10	8	0	1	21.3 x 17.3 x 6.8	$1,259
Main Street Computer Products, Inc. (617) 383-3397	**MS T2000**	**80286**	**MS-DOS, PC-DOS**	**1M byte**	**360K bits**	**0-160M bytes**	**6, 8 selectable**	**8**	**2**	**1**	**21.3 x 17.3 x 6.8**	**From $1,695**
Markham International Ltd (617) 769-7272	Markham International AT	80286	MS-DOS 3.2	640K bits	1.2M bytes	User-defined	6, 8, 11.25 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,2[illegible]
May Computers Corp. (714) 897-2037	**Baby 286**	**80286**	**MS-DOS 3.2**	**1M byte**	**360K bits**	**0-80M bytes**	**6, 10, 12 selectable**	**8**	**1**	**1**	**19.1 x 21.8 x 8.2**	Contact vendor
Microcomputer Concepts (800) 772-3914	AT-Compatible System	80286	MS-DOS	1M byte	1.2M bytes	NA	6, 8 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,399
Micro Express (714) 662-1973	**ME 286 series**	**80286**	**MS-DOS 3.2**	**1M byte**	**1.2M bytes**	**20M-120M bytes**	**8, 10, 16 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$1,299-$1,799**
	ME 386	**80386**	**MS-DOS 3.2**	**512K bits**	**1.2M bytes**	**30M-120M bytes**	**16**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**$2,895**
Micro Five Corp (714) 957-1517	Series 5000	80286	MS-DOS, Xenix, Pick, Basic, Novell	1M-16M bytes	1.2M-2.4M bytes	20M-390M bytes	8-12 selectable	9	1	1	23.0 x 19.0 x 7.0	$2,4[illegible]
	Series 6000	80286	MS-DOS, Xenix, Pick, Basic, Novell	1M-16M bytes	1.2M-2.4M bytes	20M-140M bytes	10	6	1	1	15.0 x 16.0 x 7.0	$[illegible],995
Microperach, Inc. (714) 996-3600	**Peach 2000**	**80286**	**MS-DOS, PC-DOS**	**640K bits-1M byte**	**1.2M bytes**	**30M-40M bytes**	**6, 8 selectable**	**8**	**0**	**0**	**21.3 x 17.3 x 6.8**	Contact vendor
Micro Smart, Inc (617) 872-9090	Turbo M 286	80286	MS-DOS	1M byte	1.2M bytes	NA	6, 8, 12 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,199.95
Microstar (312) 908-3323	**Microstar AT**	**80286**	**MS-DOS**	**1.2M bytes**	**360K bits-1.2M bytes**	**30M bytes**	**6, 10 selectable**	**8**	**0**	**1**	**21.3 x 17.3 x 6.8**	**$1,899**
Micro Systems Engineering Corp (408) 257-4249	Turbo AT	80286	MS-DOS 3.1, 3.2, 3.3	640K bits-1M byte	360K bits-1.2M bytes	20M-80M bytes	12	8	1	1	21.3 x 17.3 x 6.8	$1,295
	Micro 286	80286	MS-DOS 3.1, 3.2, 3.3	640K bits-1M byte	360K bits-1.2M bytes	20M-80M bytes	10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,095
Mini-Micro Business Systems (303) 444-3746	**751 Laptop Portable/386**	**80386**	**MS-DOS 3.3, MS OS/2, Unix, Xenix**	**512K bits**	**360K bits-1.2M bytes, 720K bits**	**20M-100M bytes**	**16**	**8**	**3**	**1**	**9.5 x 15.5 x 6.6**	**$3,995**
	TSI PC Tower/VA	**80286**	**MS-DOS 3.0, 3.3**	**512K bits**	**1.2M bytes**	**Optional**	**8**	**8**	**3**	**1**	**20 x 22 x 8**	**$995**
	TSI Laptop Portable/286	**80286**	**MS-DOS, Xenix**	**1M byte**	**1.2M bytes**	**30M-300M bytes**	**12**	**5**	**1**	**1**	**9.5 x 15.5 x 8**	**$2,995**
	TSI PC-Tower/386	**80386**	**MS-DOS 3.3, MS OS/2, Unix, Xenix**	**1M-16M bytes**	**360K bits-1.2M bytes**	**40M-1,000M bytes**	**16, 20 selectable**	**8**	**1**	**1**	**8 x 22 x 20**	**$4,995-$5,795**
Mitac International (800) 321-8344	Computitan AT	80286	MS-DOS 3.2 GW Basic	1M byte	1.2M bytes	NA	10	8	0	0	Standard	$1,02[illegible]
	Computitan AT Plus	80286	MS-DOS 3.2 GW Basic	1M byte	1.2M bytes	30M bytes	10	8	0	0	Standard	$2,11[illegible]
The Mom Corp. (800) 241-1170	**Smartstation AT**	**80286**	**MS-DOS 3.3**	**1M byte**	**360K bits-1M byte**	**0-300M bytes**	**6, 8, 16, 12 selectable**	**8**	**1**	**1**	**21.3 x 17.3 x 6.8**	**Contact vendor**
NCR Corp (513) 445-7478	3390 Workstation	80286	MS-DOS	512K-640K bits	720K bits	20M bytes	6, 10 selectable	1	2	1	11.0 x 15.0 x 2.75	From $89[illegible]
	PC8	80286	MS-DOS, Xenix	256K-640K bits	360K bits-1.2M bytes	20M-128M bytes	6, 8 selectable	8	1	1	21.0 x 16.0 x 6.0	From $[illegible]

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
NEC Information Systems, Inc (617) 264-8000	APC IV Powermate 2	80286	MS-DOS 3.2	640K bits-10.5M bytes	360K bits-1 2M bytes	20M-66M bytes	8, 10 selectable	8	2	1	18.0 x 16.5 x 8 0	$2,595
	APC IV Powermate 1	80286	MS-DOS 3.2	640K bits-8 6M bytes	1 2M bytes	20M-40M bytes	8	8	1	1	18 5 x 18 5 x 6 0	$1,995
	APC IV Businessmate	80286	MS-DOS SCO-Xenix	640K bits-10 6M bytes	1 2M bytes	86M bytes	8 10	—	8	—	—	Contact vendor
Nippon Electronic Technology Corp (415) 490-4850	V286	80286	MS-DOS 3 2	1M byte	360K bits 1 2M bytes	40M 120M bytes	6 8 10 selectable	8	1	1	—	Contact vendor
Norrell Corp. (213) 451-5258	386 Compatible	80386	MS-DOS	1M-4M bytes	360K bits-1 2M bytes	85M-170M bytes	18	8	1	1	21 3 x 17 3 x 6 8	Contact vendor
	286 System	80286	MS-DOS	1M byte	360K bits-1 2M bytes	33M-170M bytes	10	8	1	1	21.3 x 17 3 x 6 8	Contact vendor
Olivetti USA (201) 326-8200	M28	80286	MS-DOS	512K 640K bits	360K bits	20M 70M bytes	8	7	1	1	16 6 x x 15 2 x 7 3	$4 450
Orientec of America (213) 268-4001	Orientec AT	80286	MS-DOS	1M byte	360K bits-1 2M bytes	20M 80M bytes	6, 10 selectable	8	1	1	21 3 x 17 3 x 8 8	$1,599
Packard Bell Electronics, Inc. (800) 521-7979	VT286 Business Computer	80286	MS-DOS 3 2 Xenix GW Basic	640K bits 1M byte	1 2M bytes	20M-170M bytes	8 10 selectable	8	1	1	21 25 x 17 24 x 6 24	$2 495 $2 795
PC American Marketing, Inc (800) 654-5365	PC AM 8-MHz Turbo System	8088	MS-DOS	640K bits	360K bits	20M 130M bytes	8	8	1	1	21 3 x 17 3 x 6 8	$895
PC Buyers Group (800) 822-8937	AT Plus	80286	MS-DOS	512K bits 1M byte	1 2M bytes	NA	6 10 selectable	8	0	1	21 3 x 17 3 x 6 8	$995
PC Designs, Inc. (918) 252-5550	GV286	80286	MS-DOS, Unix, Xenix	1M byte	360K bits-1.2M bytes	24M 30M bytes	12	8	2	1	21 3 x 17 3 x 6 8	$3 525
	GV386	80386	MS-DOS, Unix, Xenix	1M-4M bytes	360K bits-1 2M bytes	40M-130M bytes	16	8	2	1	21.3 x 17 3 x 6 8	$3,950
PC Pro Systems (800) 451-5279	Turbo 286	80286	MS-DOS	384K bits 1M byte	1 2M bytes	30M 130M bytes	6 10	8	1	1	—	From $1 199
PC's Limited (800) 426-5150	PC s 286/12	80286	MS-DOS	1M-8M bytes	360K bits-1 2M bytes	20M-80M bytes	6 12 selectable	8	2	1	21.3 x 17 3 x 8 8	From $2 964
	PC s 286	80286	MS-DOS	1M-8M bytes	360K bits-1 2M bytes	20M-80M bytes	6, 8 selectable	8	2	1	21.3 x 17 3 x 6 8	From $1 764
Pine Computer Inc (818) 575 1882	Pineson AT	80286	MS-DOS 3.1	512K bits 1M byte	360K bits 1 2M bytes	30M bytes	6 10 selectable	8	0	1	21 3 x 17 3 x 6 8	$1 399
PMA (415) 968-5755	PMA AT	80286	MS-DOS 3 0 or higher	1M byte	360K bits-1 2M bytes	User-defined	6 8 selectable	8	User-defined	User-defined	21 3 x 17 3 x 8 8	Contact vendor
Princeton Computer Products (609) 799-4440	AT System IV	80286	MS-DOS PC DOS 3 1 3 2	1M byte	360K bits 1 2M bytes	40M bytes	6 8 selectable	8	0	1	21 0 x 16 0 x 6 5	$2 295
Proteus Technology Corp (201) 288-8629	Proteus 286 Standard	80286	MS-DOS	1M-4M bytes	360K bits-1 2M bytes	20M-360M bytes	8, 10 selectable	8	3	2	21 3 x 17 3 x 6.8	$2 195
	Proteus 286E	80286	MS-DOS	1M-4M bytes	1 2M bytes	20M 360M bytes	6 8 10 selectable	8	2	2	21 3 x 17 3 x 6 8	From $1,295
	Proteus 286 X18	80286	MS-DOS	1M-4M bytes	360K bits-1 2M bytes	0-360M bytes	6 8 18 selectable	8	3	2	21.3 x 17 3 x 8 8	$2 945
	Proteus 286 GT	80286	MS-DOS	1M-4M bytes	360K bits-1 2M bytes	0-360M bytes	10, 12 selectable	8	3	2	21 3 x 17 3 x 6 8	$2 495
QIC Research, Inc (408) 942-8086	QIC 286-QT	80286	MS-DOS PC DOS	512K bits 1M byte	1 2M bytes	NA	8	8	0	0	21 3 x 17 3 x 6 8	$1 026
	QIC 1800A	80286	MS-DOS PC DOS	512K bits 1M byte	1 2M bytes	NA	10	8	0	0	21 3 x 17 3 x 6 8	$1 125
Romanscus Corp (213) 327-9300	10-MHz Color System	80286	MS-DOS 3 2	512K bits-1M byte	1 2M bytes	20M bytes	6, 10 selectable	8	—	1	21 3 x 17.3 x 8 8	$1,255-$1,455
Samson Computer International Co (818) 284 1680	AT PC Compatible	80286	MS-DOS 3 2	1M byte	1 2M bytes	30M bytes	6 8 selectable	8	1	1	21 3 x 17 3 x 6 8	$1 999
Sanyo Business Systems Corp (201) 440-9300	MBC 990	80286	MS-DOS 3 1	512K bits	1 2M bytes	NA	6, 8 selectable	8	0	0	—	$1,999
Sefco Computer Products (213) 205-0828	Baby AT	80286	MS-DOS 3 1 3 2	1M byte	360K bits 1 2M bytes	NA	6 10 selectable	8	1	1	—	$800-$900
SF Micro (415) 929-1505	SF 286 Model 1800	80286	MS-DOS 3 2	512K bits	1 2M bytes	30M bytes	8	8	1	1	21 2 x 16 8 x 6 5	$1,595
	SF 286 Model 1800A	80286	MS-DOS 3.2	512K bits	1 2M bytes	30M bytes	10	8	1	1	21 2 x 16 6 x 8 5	$1,695
Shamrock (805) 373-7847	Shamrock 286 10	80286	MS-DOS 3 2	640K bits	1 2M bytes	20M bytes	6 10 selectable	8	0	0	21 25 x 6 24 x 7 24	$1 249
Southern California Systems, Inc (800) 237-SCSI	SCSI 286-10/0	80286	MS-DOS 3 1 or higher	512K bits-1M byte	1 2M bytes	30M-80M byte	10	8	2	1	21 3 x 17.3 x 8.8	$1,390
	SCSI 286	80286	MS-DOS 3 2 or higher	512K bits-1M byte	1 2M bytes	20M-80M bytes	8	8	0	1	21.3 x 17 3 x 8 8	$1,028
	SCSI 286-10	80286	MS-DOS 3 2 or higher	512K bits-1M byte	1.2M bytes	20M-80M bytes	10	8	0	1	21 3 x 17.3 x 6 8	$1,128
Suntronics Inc (213) 644 1140	Sun 286 Plus	80286	MS-DOS PC DOS Xenix	512K bits 1M byte	360K bits 1 2M bytes	20M 80M bytes	6 8 selectable	7	0	1	19 0 x 16 5 x 6 0	From $1 130
Supreme Techtronics Corp (408) 437-1306	STC Escort PC 1990 Smart 80	80286	MS-DOS 3.2	1M byte	1 2M bytes	20M-40M bytes	8, 8, 10, 12 selectable	8	1	1	21 3 x 17 3 x 8 8	$1,974
Supreme USA, Inc (714) 739-0106	GAT 286	80286	MS-DOS	1M byte	360K bits-1 2M bytes	20M-140M bytes	6, 10 selectable	8	1	1	21 3 x 17 3 x 6 8	From $1 295

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Talbott Development Corp. (703) 795-8815	**Comet AT**	**80286**	**MS-DOS, PC-DOS**	**512K bits-10M bytes**	**360K bits-1.2M bytes**	**20M-70M bytes**	**10, 12 selectable**	**8**	**4**	**3**	**21.25 x 17.28 x 6.38**	**$1,837-$2,962**
	Comet AT 386	**80386**	**MS-DOS, PC-DOS**	**512K bits-15M bytes**	**360K bits-1.2M bytes**	**20M-140M bytes**	**16, 20 selectable**	**8**	**4**	**3**	**21.25 x 17.28 x 8.38**	**$4,342-$5,342**
	Portable Comet AT-286	**80286**	**MS-DOS, PC-DOS**	**512K bits-10M bytes**	**360K bits-1.2M bytes**	**20M-70M bytes**	**10, 13 selectable**	**8**	**4**	**3**	**19.0 x 17.28 x 7.75**	**From $2,363**
	286 or 386 Laptop	**80286, 80386**	**MS-DOS, PC-DOS**	**640K bits-8M bytes**	**360K bits-1.2M bytes**	**40M-140M bytes**	**16**	**5**	**—**	**—**	**—**	**Contact vendor**
	Portable Comet AT-386	**80386**	**MS-DOS, PC-DOS**	**512K bits-15M bytes**	**360K bits-1.2M bytes**	**20M-140M bytes**	**16**	**8**	**4**	**3**	**19.0 x 17.28 x 7.75**	**$5,000-$7,000**
Tandon Corp. (818) 993-6644	Targa-40	80286	MS-DOS 3.2	1M-16M bytes	1.2M bytes	40	6, 8 selectable	5	1	—	Standard	$2,499
	Targa 20	80286	MS-DOS 3.2	1M-16M bytes	1.2M bytes	20	6, 8 selectable	5	1	—	Standard	$1,999
	PCA series	80286	MS-DOS 3.2	1M byte-16M bytes	1.2M bytes	0-70M bytes	6, 8 selectable	8	1	1	Standard	$1,899-$3,699
Tandy Corp. (817) 878-4969	**Tandy 3000 HD**	**80286**	**MS-DOS 3.2**	**512K-640K bits**	**1.2M bytes**	**20M-40M bytes**	**8**	**10**	**1**	**1**	**19.0 x 18.0 x 6.5**	**$2,199-$4,299**
Tatung Co. of America, Inc. (213) 979-7055	TCS-7000	80286	MS-DOS 3.2	640K bits-1M byte	1.2M bytes	NA	6, 8, 10 selectable	8	0	0	21.25 x 17.0 x 6.0	From $2,195
Technoland, Inc. (800) 222-3978	**Technoland 286**	**80286**	**MS-DOS**	**512K bits-1M byte**	**1.2M bytes**	**NA**	**8**	**8**	**0**	**0**	**Standard**	**From $1,059**
Televideo Systems, Inc. (408) 745-7760	Televideo Telecat-286 series	80286	MS-DOS 3.1	512K bits-1M byte	1.2M bytes	20M-40M bytes	6, 8	5	1	1	16.0 x 16.5	Contact vendor
Telex Computer Products, Inc. (818) 627-1111	**1280 Intelligent Workstation**	**80286**	**MS-DOS 3.1, Xenix, Unix**	**512K bits**	**360K bits-1.2M bytes**	**10M-70M bytes**	**6, 10 selectable**	**8**	**1**	**1**	**18.25 x 18.0 x 6.67**	**$2,335-$6,000**
Tempest Products, Inc. (703) 471-6960	Tempest AT	80286	MS-DOS, Xenix, Unix	1M byte	1.2M bytes	2M-144M bytes	6, 8 selectable	8	2	1	23.3 x 17.5 x 7.2	From $4,999
Texas Instruments, Inc. (800) 232-3200	**The Business-Pro**	**80286**	**MS-DOS 3.0, Xenix 3**	**512K bits**	**—**	**21M, 40M, 72M, 145M bytes**	**8**	**14**	**1**	**1**	**7.8 x 18.5 x 18.6**	**$3,995-$9,185**
Toshiba America, Inc. (714) 730-5000	T3100	80286	MS-DOS 3.2	640K bits-2.6M bytes	720K bits	10M bytes	4.77, 8 selectable	1	1	1	12.6 x 14.2 x 3.1	$4,199
True Data Products, Inc. (617) 278-6555	**AT-Compatible**	**80286**	**MS-DOS 3.1**	**640K bits-1M byte**	**360K bits**	**20M bytes**	**6, 8, 10 selectable**	**8**	**1**	**1**	**19.6 x 16.1 x 5.5**	**$1,539.90**
Ultra Corp. (314) 621-4999	The Ultra AT	80286	—	1M byte	1.2M bytes	NA	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	Contact vendor
Ultra Tech Distributed (516) 741-3133	**GIM A/P**	**80286**	**MS-DOS 3.1**	**512K-1M byte**	**1.2M bytes**	**20M bytes**	**8**	**7**	**0**	**1**	**—**	**Contact vendor**
	GIM A/5	**80286**	**MS-DOS 3.1**	**512K bits-1M byte**	**1.2M bytes**	**30M bytes**	**8**	**8**	**0**	**1**	**21.3 x 17.3 x 6.8**	**Contact vendor**
Unisys Corp. (800) 547-8362	PC IT	80286	MS-DOS 3.2	512K bits	360K bits-1M byte	40M bytes	8	8	2	1	23.0 x 17.0 x 7.0	$3,441.95
	MICRO IT	80286	MS-DOS 3.2	512K bits-3.5M bytes	360K bits	20M-40M bytes	8	5	2	1	15.0 x 15.0 x 5.5	$2,620
United Computer Resources (215) 627-5454	**Beltron 386**	**80386**	**MS-DOS 3.2**	**1M bytes**	**1.2M bytes**	**NA**	**12**	**8**	**0**	**0**	**21.3 x 17.3 x 8.8**	**$3,000-$6,000**
	Beltron AT	**80286**	**MS-DOS 3.2**	**1M byte**	**1.2M bytes**	**NA**	**10**	**8**	**2**	**1**	**21.3 x 17.3 x 6.8**	**$1,295-$2,500**
USA Electronics (214) 350-0212	USA AT System	80286	MS-DOS 3.2	1M byte	360K bits	20M bytes	8, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,100-$1,900
Victor Technology, Inc. (408) 438-6680	**V286**	**80286**	**MS-DOS 3.2**	**512K bits-1M byte**	**1.2M bytes**	**0-40M bytes**	**6, 8 selectable**	**7**	**1**	**1**	**21.0 x 17.0 x 8.0**	**Contact vendor**
VIPC Computers (800) 222-5657	VIPC 386	80386	MS-DOS, PC-DOS	1M-10M bytes	360K bits-1.2M bytes	0-96M bytes	16	8	1	1	21.3 x 17.3 x 6.8	$[illegible]
	VIPC AT	80286	MS-DOS, PC-DOS 3.2	1M byte	360K bits-1.2M bytes	0-96M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$899
Wang Laboratories, Inc. (800) 522-WANG	**Wang PC 280**	**80286**	**MS-DOS 3.2**	**640K bits-10.5M bytes**	**360K bits-1.2M bytes**	**20M-68M bytes**	**6, 8, 10 selectable**	**8**	**1**	**1**	**18.2 x 21.4 x 6.6**	**Contact vendor**
	Wang PC 380	**80386**	**MS-DOS 3.2**	**2.5M-10.5M bytes**	**360K bits-1.2M bytes**	**20M-68M bytes**	**8, 16 selectable**	**8**	**1**	**1**	**16.2 x 21.4 x 6.6**	**Contact vendor**
Wells American (803) 796-7800	A Star II series	80286	PC DOS	512K bits-1M byte	1.2M bytes	0-80M bytes	6, 8, 10, 12 selectable, 14 optional	8	Model 300 only	Model 300 only	21.3 x 17.3 x 6.8	From $1,695
Western Computer (714) 553-1681	**Western 286 Tower**	**80286**	**MS-DOS 3.2**	**512K bits-1M byte**	**1.2M bytes**	**20M-115M bytes**	**8, 10 selectable**	**8**	**8**	**1**	**—**	**$2,178**
	Western AT 286 Turbo	**80286**	**MS-DOS 3.2**	**512K bits-1M bytes**	**1.2M bytes**	**20M-115M bytes**	**8, 10 selectable**	**8**	**1**	**1**	**Standard**	**$1,478**
	Western 386 Tower	**80386**	**MS-DOS 3.1**	**512K bits-2M bytes**	**1.2M bytes**	**20M-300M bytes**	**16**	**8**	**10**	**1**	**—**	**$4,195**
	Western 386 Advantage	**80386**	**MS-DOS 3.1**	**512K bits-2M bytes**	**1.2M bytes**	**20M-300M bytes**	**16**	**8**	**0**	**1**	**Standard**	**$3,495**
Wyse Technology (800) GET-WYSE	Wyse PC 286	80286	MS-DOS	640K bits	1.2M bytes	20M-40M bytes	10	8	1	1	Standard	$1,999-$[illegible]
	Wyse PC 386 Model 3216	80386	MS-DOS, Unix, Xenix	1M-24M bytes	360K bits-1.2M bytes	40M bytes	8, 16 selectable	6	1	1	Standard	$[illegible]-$4,999
Zax Corp. (800) 421-0982	**ZAX Box-ER**	**80286**	**MS-DOS 3.1**	**640K bits-1M byte**	**1.2M bytes**	**20M bytes**	**8**	**8**	**1**	**1**	**Standard**	**$4,695**
Zenith Data Systems (800) 842-9000	Z 386	80386	MS-DOS 3.3	1M-3M bytes	360K bits-1.2M bytes	40M-80M bytes	16	6	1	1	21.3 x 17.3 x 6.8	$6,499-$7,499
	Z 248	80286	MS-DOS	512K-640K bits	1.2M bytes	20M-40M bytes	8	5	1	1	21.3 x 17.3 x 6.8	$4,399-$4,999
Z-Nix Co. (213) 493-2516	**Z-Nix**	**80286**	**MS-DOS 3.2**	**256K bits**	**1.2M bytes**	**30M bytes**	**8, 12**	**8**	**1-4**	**1-2**	**Standard**	**$1,200**
Z Technology Systems (415) 588-3386	ZTS 286 Plus	80286	MS-DOS 3.3	1M byte	1.2M bytes	44M bytes	10	8	2	1	Standard	$1,399
	ZTS 386	80386	MS-DOS 3.3	2M bytes	1.2M bytes	44M bytes	16	8	2	1	Standard	$[illegible]

IBM Personal Computer XT compatibles

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD POTENTIAL)	FLOPPY DISK STORAGE (STANDARD POTENTIAL)	HARD DISK STORAGE (STANDARD POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH DEPTH HEIGHT)	PRICE
Acer Technologies, Inc (408) 922-0333	Acer 710	8088	MS-DOS	768K bits	360K bits	0-20M bytes	4.77-10 selectable	—	—	—	14.2 x 10.8 x 5.0	From $1,795
Advanced Computer Products, Inc (714) 558-8822	Advanced PC XT	8088	MS-DOS 3.1	640K bits	360K bits	Optional	4.77	3	1	1	15.0 x 19.0	$625
Advanced Logic Research (714) 581-6770	Advantage EXT Turbo	8088-2	MS-DOS 3.2	640K bits	256K bits	NA	4.77-8 selectable	8	1	1	18.0 x 16.1 x 5.5	$1,390
Afton Computer Inc (713) 553-1611	XT Turbo	8088-2	MS-DOS 2.0	640K bits	360K bits	0-40M bytes	4.77-8 selectable	8	1	1	19.6 x 16.1 x 5.5	$476
Alpha Omega Computer Products, Inc (813) 545-6422	PC II AD	8088	MS-DOS 3.2	256K bits-1M byte	360K bits-1.2M bytes	User-defined	4.77-8 selectable	8	1	1	—	$799
American Computer & Peripheral Inc (714) 545-2004	American Mate-88	8088	MS-DOS	640K bits	360K bits	225M bytes	4.77	8	2	1	19.6 x 16.1 x 5.5	$2,995
American Micro Technology (714) 731-6000	Trans/Pro 2	8088-2	MS-DOS	640K bits	User-defined	User-defined	4.77-8 selectable	8	0	0	Huggable size	$875
American Research Corp (800) 423-3877	ARC Turbo Mode	8088	ARC MS-DOS 3.0	640K bits	360K bits	20M-30M bytes	4.77-10 selectable	8	1	1	19.6 x 16.1 x 16.1	$1,295
American Semiconductor (813) 961-0444	American Semiconductor Clone	8088-2	MS-DOS	256K bits	360K bits	NA	4.77-8 selectable	8	0	0	—	Contact vendor
Artificial Technology (415) 490-9311	XT Turbo	80286	MS-DOS 3.1	256K bits	360K bits	20M bytes	4.77-8 selectable	8	1	1	19.6 x 16.1 x 5.5	$[illegible]
Baby Micro, Inc (303) 790-7758	Baby XT	8088	MS-DOS	256K bits-640K bits	256K bits	NA	4.77	8	0	1	16.0 x 16.1 x 5.5	$599
	Baby Turbo XT	8088-2	MS-DOS, PC DOS	256K bits-640K bits	360K bits	NA	4.77-8 selectable	8	0	1	19.6 x 10.1 x 5.8	$699
04B (617) 750-3220	PC XT [illegible]	8088	MS-DOS	640K bits	360K bits	20M bytes	4.77-8 selectable	8	2	1	19.6 x 16.1 x 5.5	$1,133
Beam Time, Inc (408) 727-4877	B Turbo	NEC V 20	MS-DOS	640K bits	360K bits	20M bytes	8.1	8	1	1	19.0 x 10.1 x 5.5	$775
Bentley Computer Products (312) 250-9897	Bentley Micro-7	8088	MS-DOS 3.2	256K bits	360K bits	NA	4.77-8	8	0	0	19.6 x 16.1 x 5.5	$393
Bi-Tech Enterprises, Inc (516) 567-8128	Long Island PC XT	8088-2	MS-RPC 2.8 or higher	640 bits	360K bits-3.5M bytes	10M-100M/1,700M bytes	4.77-8 selectable	8	1	1	10.5 x 17.5 x 5.5	$870
Bostom Systems, Inc (914) 442-0020	Port XT System	80286	MS-DOS	640K bits	360K bits	NA	4.77-8 selectable	4	1	1	13.0 x 15.0 x 7.0	$969
Blue Chip Electronics, Inc (602) 381-1485	Blue Chip Personal Computer	8088	MS-DOS 3.2	512K bits	360K bits	NA	4.77	6	1	1	15.0 x 15.6 x 5.5	Contact vendor
	Blue Chip Turbo Personal Computer	8088-2	MS-DOS 3.2	512K bits	360K bits	NA	4.77-8 selectable	6	1	1	15.0 x 15.6 x 5.5	Contact vendor
Bondwell Industrial Co (415) 490-4300	Bondwell 88	8088	MS-DOS 3.3	640K bits	360K bits	20M bytes	4.77-8 selectable	—	1	1	15.6 x 14.5	$[illegible]
Brock (408) 727-8587	Brock XT Turbo	8088-2	MS-DOS, PC DOS	640K bits	360K bits	20M bytes	4.77-8 selectable	8	1	1	19.0 x 10.1 x 5.5	$1,050
Canon USA, Inc (516) 488-6700	A-200 II	8086	MS-DOS 2.1	256K bits	360K bits	20M bytes	8	8	1		19.0 x 16.1 x 5.5	$1,945
Capmech (415) 791-7001	Capmech Turbo-88	8088-2	MS-DOS 3.1, 3.2	640K bits	360K bits	20M bytes	4.77-8 selectable	8	2	1	—	$995
Cascade Electronics, Inc (507) 443-7997	Cascade Electronics XT Computer System	8088	MS-DOS 3.2	640K bits	360K bits	20M bytes	4.77-8 selectable	8	1		Standard	$699
Century Micro Systems (714) 666-2293	CMS-1100-Series	8088	MS-DOS 3.2	640K bits	360K bits	NA	4.77-8 selectable	6	0	1	18.0 x 15.0 x 8.0	$850
	CMS-1200	8088	MS-DOS 3.2	256K-640K bits	360K bits	NA	4.77-8 selectable	8	0	1	19.6 x 16.1 x 5.5	$750
Challenger Computer Inc (617) 275-3517	Challenger XT Turbo	8088-2	PC DOS	256K-640K bits	360K bits	NA	8	8	1	0	Standard	Contact vendor
	XT 186	8086	PC DOS	256K-640K bits	360K bits	0-25M bytes	8.17	8			Standard	Contact vendor
Chicago Computer Connection, Inc (800) 423-3806	CCC XTC	8088-2	MS-DOS 2.0 or higher	256K-640K bits	256K bits	30M bytes	4.77-8 selectable	8	0	1	18.6 x 16.1 x 5.6	$989
	CCC Portable XT	—	MS-DOS	256K-640K bits	360K bits	NA	4.77-8 selectable	2	0	1	—	$995
Clone Computers (214) 637-5400	Standard Clone	8088	MS-DOS 3.2	640K bits	360K bits	20M-40M bytes	4.77	8		1	19.6 x 16.1 x 5.5	$699
	Turbo Clone	8088-2	MS-DOS 3.2	640K bits	360K bits	20M-40M bytes	4.77-8 selectable	8		1	19.6 x 16.1 x 5.5	$799
Clone Factory (213) 477-0447	Turbo-XT-Clone	V20	MS-DOS 3.2	640K bits	360K bits	20M bytes	4.77-8 selectable	8	1	1	19.25 x 17.25 x 5.75	$804
Clone Technologies, Inc (913) 469-0400	Clone Turbo XT	8088	MS-DOS 3	640K bits	360K bits	20M bytes	4.77-8 selectable	8			19.0 x 16.1 x 5.5	$[illegible]
Columbia Data Products, Inc (305) 774-1111	Columbia 1000	8088	MS-DOS 6.11	640K bits	360K bits	10M bytes	4.77	8	2	1	19.0 x 16.1 x 5.5	$975
Comark Corp (312) 351-9700	Turbo 8088 XT Turbo	8088-2	MS-DOS 3.1	640K bits	360K bits	20M-40M bytes	4.77-8 selectable	8		1	19.6 x 16.1 x 5.5	Contact vendor
Commodore Business Machines, Inc (215) 431-9100	Commodore PC 40 series	8088	MS-DOS 3.2	512K-640K bits	360K-720K bits	40M bytes	4.77	5	1	1	19 x 14 x 5	$999-$1,199
Compact Computer Corp (713) 170-0670	Designer PC	8088	MS-DOS Basic 3.10	256K-640K bits	360K bits	NA					19.6 x 16.1 x 6.4	Contact vendor
Competitive Computer Components (800) 443-0834	Competitive Computer Components XT Turbo	8088-2	MS-DOS	640K bits	360K bits	NA	4.77-8 selectable	8	8	1	18.6 x 16.1 x 5.5	From $577
	Competitive Computer Components-Enhanced XT Turbo	8088-2	MS-DOS	640K bits	360K bits	—	4.77-8 selectable	8	1	2	19.6 x 16.1 x 3.5	From $988
Complete Computer Systems (214) 339-8333	CCS XT	8088	MS-DOS 3.1	640K bits	360K bits	NA	4.77-8 selectable	8	0	3	19.5 x 16.1 x 5.5	$799
Computar Inc (818) 645-3383	Computar Turbo-XT	D 70108-8	MS-DOS 3.2	640K bits-1M byte	360K bits	20M-80M bytes	4.77-8 selectable	8	2	1	19.6 x 16.1 x 5.5	$699
	Computar Turbo-AT	—	MS-DOS, Unix System V	1M byte	1.2M bytes	40M bytes	12	8	1	1	19.6 x 16.1 x 5.5	$2,499
Compudel (512) 250-1489	Standard 88	8088	MS-DOS 3.1 or higher	256K bits	360K bits	NA	6.77	8	0	0	19.6 x 16.1 x 5.5	$395
Compucorp (213) 306-2626	Connection 8088-Turbo	8088	MS-DOS 3.2	640K bits	360K bits	20M-30M bytes	8-6 selectable	5	2	2	18.6 x 18.1 x 3.5	Contact vendor
Computer Age Inc (203) 724-5100	Commodore Turbo XT	8088	MS-DOS 3.1	640K bits	360K bits	NA	4.77-8 selectable	8	1	1	19.6 x 16.1 x 5.5	$695
Computer Creations Inc (513) 836-8707	Professional XT	8088-2	MS-DOS	640K bits	360K bits	NA	4.77-8 selectable	8	1	1	18.0 x 18.1 x 5.5	$579
Computerland Corp (415) 639-2035	BC 88	8088	MS-DOS 3.2	256K bits	NA	NA	4.77-8 selectable	8	1	1	16.25 x 16.25 x 6.25	$1,495
Computer Library (416) 489-8784	XT Turbo System	8088	MS-DOS 3.1	256K-640K bits	360K bits	NA	4.77-8 selectable	8	0	0	18.6 x 16.1 x 5.5	$399
Computer Mail Order (800) 233-8950	MF PC Tx	8088-2	MS-DOS 2.1	640K bits	360K bits	20M bytes	4.77	8	0	0	—	$999
	MF PC Tx XT Turbo	8088-2	MS-DOS 2.1	640K bits	360K bits	20M bytes	4.77-8 selectable	8	0	0		$1,049
Computer Products United (800) 834-2938	CPU XT Turbo	V20	MS-DOS 2.1	640K bits	—	20M bytes	8	8	1	1	18.2 x 16.13 x 5.8	$1,000

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors.

Lines shift

CONTINUED FROM PAGE S11

talked to [IBM]," Bobzin says, "and they've said it's not their policy to say anything. If they decide we're infringing, we'll hear from them. If we're OK, we'll never hear from them. We've had a product on the market since 1984, and we've never heard from them."

Bobzin emphasizes the pervasiveness of Phoenix's ROM BIOS. "We have close to 150 licensees using our BIOS, ranging in size from Tandy to guys in a garage knocking out clones. In fact, we believe there are more machines with Phoenix's BIOS than Compaq's," he says.

Bobzin says his customers can, to some extent, provide better performance at a lower price than IBM. "A 386 system with the Phoenix BIOS may well outperform, and be cheaper than, a PS/2 Model 60 [with a 286 CPU] just because it has a 386. IBM has done a lot of investing in coordinating electrical and mechanical design to produce a pleasing package, and some of that you can't do at the AT-level technology. But our customers want price and performance, and many can provide that better than IBM."

How sturdy are the defenses?

The overall performance of any computer system is determined not only by the speed of the CPU but also by the speed of the other components and how fast these components can communicate with each other. In the new IBM computers, intercomponent communications are performed by IBM's new electronic device called the Micro Channel.

Although IBM is patenting this device, there is evidence the company will permit clone makers to use this new technology. According to Colony, an unnamed source at IBM told him that the company does not plan to sue anyone that uses it, although the company may change its mind.

Clone makers are looking closely at IBM's historical policy of establishing cross-licensing agreements with other computer vendors. These agreements usually permit the vendor to use IBM's patents in exchange for reasonable compensation or sometimes just for the right to use the vendor's patents.

IBM's most recent statement on this policy is as follows: "IBM's practice regarding protection of intellectual property has not changed. IBM continues its licensing practice in regard to utility patents as it has in the past. IBM will license its utility patents on a nondiscriminatory basis under reasonable terms and conditions. IBM also continues its practice not to license design patents, copyrighted microcode and other copyrighted material."

Whether this will mean the Micro Channel will be freely available to competitors is still very much in doubt. IBM spokesman Scott Brooks says, "The Micro Channel comprises many different elements, which are protected by intellectual property law. It's really a whole Micro Channel architecture covered by trade secrets, copyrights and so forth."

According to Phoenix's Bobzin, IBM's relicensing policy will not solve the clone makers' problems for a long time. "IBM has a practice of relicensing, so once they have a legal patent, we can expect them to license it to anyone who uses it in a legal and legitimate fashion. The problem is that at this time IBM has simply applied

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD POTENTIAL)	HARD DISK STORAGE (STANDARD POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH DEPTH HEIGHT)	PRICE
Computer Systems (312) 779-8700	PC/88	8088-1	MS-DOS 3.1	640K bits	360K bits	NA	4.77/8 selectable	7	1	1	18.0 x 18.1 x 5.5	$750
	Industrial PC/88	8088-1	MS-DOS 3.1	640K bits	360K bits	NA	4.77/8 selectable	7	1	1	18.9 x 19.1 x 5.5	$1,500
Continental Peripheral Unlimited (818) 282 3121	Super IXT	V20	MS-DOS 3.2	640K bits	360K bits	20M bytes	8	8	0	1	[illegible]	[illegible]
Data Dynamics (800) 384-7822	Data Dynamics-XT Turbo	—	MS-DOS 3.2	640K bits	360K bits	NA	—	8	0	1	19.0 x 16.1 x 8.5	$575
Data Lite Systems (805) 584-9104	DL Turbo Plus	8088-2	MS-DOS 3.2	640K bits	360K bits	20M bytes	4.77/8 selectable	8	1	1	[illegible]	[illegible]
Datavue Technical Systems (404) 564-5700	Super Micro 150	8088	MS-DOS 3.2	640K bits	360K bits	30M-70M bytes	150	2	1	1	18.6 x 16.3 x 5.5	$1,200
	Series-30	8088	MS-DOS 3.2	640K bits	360K bits	20M-70M bytes	10	7	1	1	19.0 x 16.3 x 5.5	$1,795
Daytapro Electronics (312) 394-0555	Mega-4000	8088-2	MS-DOS 3.2	640K bits	360K bits	NA	4.77/7.89 selectable	8	[illegible]	1	[illegible]	[illegible]
	DTK	8088-1	MS-DOS 3.2	640K bits	360K bits	NA	10	8	[illegible]		[illegible]	$499
Eastern Enterprises, Inc (848) 725-3000	Enterprise XT-Plus	8088	MS-DOS 3.2	640K	360K bits	20M-32M bytes	6, 8 selectable	8	1	1	Standard	Contact vendor
80 Microcomputer Service, Inc (518) 393 2494	80 Micro 88+	8088-2	MS-DOS 3.2 GW Basic	640K bits	360K bits	20M bytes	5, 8 selectable	8	1	1	[illegible]	[illegible]
Epson America, Inc (213) 539-9140	Equity III	8088	MS-DOS 3.1	640K bits	360K bits	NA	4.77/7.10 selectable	5	1	1	14.5 x 16.0 x 5.7	$1,295
	Equity I Plus	8088	MS-DOS 3.2	640K bits	360K bits	NA	4.77/10 selectable	5	1	1	14.6 x 16.0 x 5.7	$1,095
Five Star Computers (800) 752 5555	Five Star Express	V30	MS-DOS 3.1 3.2	640K bits	720K bits	NA	4.77/9.5 selectable	2	1	1	—	[illegible]
	Five Star XL	V20	MS-DOS 3.1 3.2	640K bits	360K bits	20M bytes	4.77/8 selectable	8	1	1	[illegible]	[illegible]
47th Street Photo (800) 221-7774	Maximum Turbo-XT	8088-2	MS-DOS 3.2	256K bits	360K bits	20M bytes	4.77/8 selectable	8	0	0	19.9 x 16.1 x 5.8	$695
GEMS Computers (408) 988-0181	GEMS Mach III 2	V20	MS-DOS 3.1	640K bits	360K bits	NA	4.77/8 selectable	[illegible]	1	2	[illegible]	[illegible]
Grid Systems Corp. (819) 961-4800	Grid Case Plus	8086	MS-DOS 2.0	640K bits	720K bits	10M bytes	4.77	0	1	1	15.0 x 11.5 x 2.0	From $2,750
Gulfstream Micro Systems Inc (305) 994-6500	GMS PC 88 2	8088	MS-DOS 3.2	640K bits	360K bits	10M-140M bytes	4.77/8 selectable	8	0	0	[illegible]	$949
Heath Co. (619) 882 3200	HS-158-W	8088-2	MS-DOS 3.2	256K-640K bits	360K bits	20M bytes	4.77/8 selectable	5	1	1	16.0 x 10.5	$1,499
Honeywell Bull Inc (617) 865-6000	PC XP	8088-2	MS-DOS 2.1	256K-640K bits	360K 720K bits	0-20M bytes	4.77/8 selectable	8	1	1	[illegible]	[illegible]
	PC EP	8088-2	MS-DOS 2.1	256K-640K bits	360K 720K bits	10M bytes	4.77/8 selectable	4	[illegible]	[illegible]	[illegible]	[illegible]
Industrial Computer Products (617) 356-7500	Pro PC XT Turbo	8088	MS-DOS 3.2	640K bits	360K bits	20M-170M bits	4.77/8 selectable	8	1-8	1	—	$895-$2,500
Information & Technology Services Inc (800) 642 2385	ITS Turbo II XT	V20	MS-DOS 3.1	640K bits	360K bits	20M 30M bytes	4.77/7.33 selectable	8	0	1		$849
Innovative Technology Ltd (800) 853-4001	Affordable XT	8088	Any version MS-DOS	640K bits	360K bits-1.2M bytes	10M-60M bytes	6, 8 selectable	8	0	0	19.4 x 16.1 x 5.5	From $425
Intelligent Data Systems Inc (213) 633 5504	PC 88	8088-2	MS-DOS	640K bits	360K 720K bits	80M 180M bytes	6, 8 selectable	8	1	1	[illegible]	[illegible]
Intelligent Micro Systems Corp. (800) 684-4031	IMS-88	8088	MS-DOS 3.2	256K-640K bits	360K bits	20M-70M bytes	8	8	0	0	18.0 x 19.0	From $549
Jahvar Technology (209) 561 3139	PC EX	8088-2	MS-DOS 3.1 3.2	640K bits	360K bits	20M 30M bytes	8	8	1		[illegible]	[illegible]
Ivy Microcomputer Corp. (847) 953-6914	DT 10	8088	MS-DOS 3.1	256K 512K bits	360K bits	10M-80M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$599
Kaypro Corp (800) 4KAYPRO	Kaypro PC 30	V20	MS-DOS	768K bits 2M bytes	360K bits	30M bytes	4.77/8 selectable	8	1	1	[illegible]	[illegible]
Leading Edge Hardware Products, Inc (617) 828-8120	Model D	8088-2	MS-DOS	512K 768K bits	—	30M bytes	4.77/7.16 selectable	4	1	1	—	$1,075
	Model D Leading Edge Infinite Memory System	80286	MS-DOS	—	—	30M bytes	6, 8, 10 selectable	4	1	1	—	$1,995
Lobo Corp (214) 234 8032	[illegible] 8088	8088	MS-DOS 3	640K bits	360K bits	20M bytes	8	8			[illegible]	[illegible]
Lucky Computers (814) 690-6119	Jumbo XT	V20	MS-DOS	640K bits	360K bits	20M 130M bytes	8	8	1	1	19.6 x 19.1 x 5.5	$725
Magitronic Technology Inc (718) 706-7870	XT system 808	8088	MS-DOS	256K-640K bits	360K bits-4M bytes	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
Main Street Computer Products, Inc (817) 393-3397	MS T1201	8088-2	MS-DOS PC DOS	640K bits	360K bits	20M bytes	4.77/8 selectable		[illegible]	1	18.6 x 16.3 x 5.5	$1,195
	MS T1300	8088-2	MS-DOS PC DOS	640K bits	360K bits	80M bytes	4.77/8 selectable	7	2	1	19.8 x 16.3 x 5.5	From $99
Markham International Ltd (617) 769-7272	Markham International XT		MS-DOS 3.2	640K bits	360K bits	[illegible]	4.77/8 selectable	8	[illegible]		[illegible]	[illegible]
May Computers Corp. (714) 897 2037	Mega 4000	8088	MS-DOS 3.1 3.2	640K bits 1M bytes	360K bits	80M bytes	4.77/8 selectable	8	1	1	[illegible]	$799
Microcomputer Concepts (800) 772 3914	XT Compatible System	8088	MS-DOS	640K bits	360K bits	NA	4.77/8 selectable	8	1	1	[illegible]	[illegible]
Micro Express (714) 662 1973	ME V20	V20	MS-DOS 3.2	640K bits	360K bits-1.2M bytes	20M-80M bytes	4.77/8 selectable	8	1	1	[illegible]	From $839
Micropeach Inc (714) 995-3600	Peach 1500 Turbo	8088-2	MS-DOS PC DOS	640K bits	360K bits	NA	4.77/8 selectable	8		1	[illegible]	Contact vendor
	Peach 1000	8088	MS-DOS PC DOS	640K bits	360K bits	NA	4.77	8			[illegible]	Contact vendor
Micro Smart Inc (617) 872 9090	Turbo M	8088-2	MS-DOS	640K bits	360K bits	NA	4.77/8 selectable	8	1	1	[illegible]	$699.95
Microstar (312) 968-3323	Microstar XT	8088	MS-DOS	640K bits	360K bits	20M bytes	4.77/8 selectable	8	1		[illegible]	[illegible]
Micro Systems Engineering Corp. (408) 257-4240	Turbo XT	8088-2	MS-DOS 3.1 3.2 3.3	640K bits	360K bits	20M 30M bytes	8	8	1	1	[illegible]	[illegible]
Mitac International (800) 321-8344	MPC 160T	8088-2	MS-DOS 3.2	[illegible]	360K bits	30M 40M bytes	4.77/8 selectable	5	1	[illegible]	[illegible]	[illegible]
The Moss Corp (800) 241 1170	Smartstation XT	8088	MS-DOS 3.2	256K-640K bits	360K bits	0-300M bytes	4.77/8 selectable	8	1	1	18.8 x 16.1 x 5.5	Contact vendor
NCR Corp (513) 445-7478	The PC6	8088	MS-DOS	256K-640K bits	360K bits	20M 30M bytes	4.77/8 selectable	8	1	1	[illegible]	[illegible]
NEC Home Electronics (USA) Inc (800) 447-4700	Multispeed	V30	MS-DOS 2.1 3.2	640K bits	720K bits	NA	4.77/9.54 selectable	1	1	1	13.0 x 12.4 x 3.1	$1,995
Nippon Electronic Technology Corp (415) 490-4650	NET V20	V20	MS-DOS 3	640K bits	360K bits	30M bytes	4.77/8 selectable	8	1	1		Contact vendor
Norsell Corp. (248) 451-5258	XT Compatible	V20	MS-DOS	640K bits	360K bits	20M 3.0M bytes	10	8	1	2	18.8 x 16.1 x 5.5	From $750

for a patent, and until they actually have the patent, which may take 18 months, no relicensing will take place," he says

The operating system

When IBM first announced the Personal Computer in 1981, the operating system marketplace became very crowded. IBM's operating system of choice was PC-DOS, its version of Microsoft Corp.'s MS-DOS, but many other operating systems, such as the University of California at San Diego's P-system and Digital Research's CP/M-86, were also vying for attention. However, the industry demanded a standard, and since MS-DOS and PC-DOS were available for IBM computers and PC-compatible computers, a consensus developed among vendors, users and third-party software developers to make that operating system the standard.

But now the forces that led to that consensus are beginning to weaken dramatically. IBM's decision to write its own proprietary portions of its OS/2 operating system will force clone manufacturers to turn to non-IBM operating systems, and once that door is opened, a number of software houses will rush to fill the need.

Even IBM seems to be turning to multiple-vendor operating system solutions, at least for now. "It was interesting that we were given the opportunity by IBM to participate in [its PS/2] announcement," says Theresa Myers, president of Santa Monica, Calif.-based Quarterdeck Office Systems, the developer of Desqview.

Desqview is not an operating system, but it works with the operating system and contains features that, while normally found in some operating systems, are not in MS-DOS. One of these is multitasking, which permits a computer to run several different tasks at once. Although multitasking has been available on minicomputers and mainframes for years, its availability has been quite limited on micros.

Although Microsoft has announced a multitasking capability for January 1988 release, the company has a reputation for being late with software deliveries. "One of the reasons IBM had us there [at the announcement], is that we're the only solution right now," Myers says.

Presentation Manager

Further complicating the current situation is the absence of specifications for IBM's OS/2 Presentation Manager, which will delay the availability of Presentation Manager-based applications. Although largely based on Microsoft Windows, Presentation Manager will nonetheless lack Windows compatibility. "Many people believe that IBM announced Windows as the presentation interface, but that's not true," Myers claims. "It's supposed to have an Applications Programming Interface, which is not yet defined, and a video display interface (VDI), which is definitely not a Windows VDI."

What this means in practical terms is that third-party software developers must be prepared to change their code when the exact specifications are announced, probably sometime in the fall. "You're talking way into 1988 or 1989 before you'll have Presentation Manager and programs associated with it," Myers predicts.

The promise of super-fast, super-functional versions of programs like Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Dbase II that run on 80386 systems with high-performance buses

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD POTENTIAL)	FLOPPY DISK STORAGE (STANDARD POTENTIAL)	HARD DISK STORAGE (STANDARD POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH DEPTH HEIGHT)	PRICE
Olivetti USA (201) 526-8200	M24	8086	MS-DOS	640K bytes	360K-720K bytes	10M-20M bytes	6	7	1	1	14.8 x 14.6 x 6.2	$2,250
Orientec of America (213) 268-4001	Orientec XT Series	8088-1, 8088-2	MS-DOS	640K bytes	360K bytes	20M-30M bytes	4.77-10 selectable	8	1	1	19.6 x 18.1 x 5.5	$630-$650
Packard Bell Electronics, Inc. (800) 521-7979	Packard Bell ZX88 Personal Business Computer	V40	MS-DOS, Basic 3.2	640K bytes	360K bytes	20M bytes	5-8 selectable	4	1	1	16.45 x 15.35 x 5.32	$999
Panasonic Industrial Co. (201) 348-7000	FX-600	8086	MS-DOS 3.1	256K-640K bytes	360K bytes	20M bytes	4.77-7.16 selectable	6	0	1	17.5 x 16.0 x 6.0	From $1,099
PC America (800) 392-0781	Systems 1	8088-2	MS-DOS 3.1	256K-640K bytes	360K bytes	20M-70M bytes	4.77-8 selectable	8	0	1	Standard	$695
PC Buyers Group (800) 622-8937	XT Plus	8088	MS-DOS	640K bytes	360K bytes	NA	4.77-10 selectable	8	0	1	19.4 x 16.1 x 5.5	$449
	XT Turbo Plus	8088-2	MS-DOS	640K bytes	360K bytes	NA	4.77-8 selectable	8	0	1	19.4 x 16.1 x 5.5	$499
PC Pro Systems, Inc. (800) 451-5279	Turbo XT	8088-2	All MS-DOS, PC-DOS	640K bytes	360K bytes	NA	4.77-8 selectable	—	1	2	—	$699
PC's Limited (800) 426-5150	PC's Limited Turbo PC	8088-2	MS-DOS	640K bytes	360K bytes	20M-40M bytes	4.77-8 selectable	6	0	1	19.6 x 16.7 x 5.5	From $764
Pan Computer Inc. (818) 575-1800	Pancom XT	8088-2	MS-DOS 3.1	256K-640K bytes	360K bytes	NA	4.77-8 selectable	8	0	1	16.8 x 16.1 x 5.5	$499
PMA (415) 968-5755	PMA XT Turbo	8088-2	MS-DOS, PC-DOS 2.0 or higher	640K bytes	360K bytes-1.2M bytes	User-defined	4.77-8.3 selectable	6	User-defined	User-defined	19.6 x 16.1 x 5.5	Contact vendor
Princeton Computer Products (800) 799-4440	XT System IV	8088-2	MS-DOS, PC-DOS 3.1-3.2	640K bytes	360K bytes	20M bytes	6	8	1	2	18.6 x 16.6 x 6.5	$1,299
Proto PC Inc. (612) 544-4660	Proto XT6	8186	MS-DOS	512K bytes-1M byte	—	—	—	—	—	—	—	Contact vendor
QIC Research, Inc. (408) 942-8086	QIC Turbo XT	8088	MS-DOS, PC-DOS	256K-640K bytes	360K bytes	NA	4.77-8 selectable	8	0	0	18.8 x 16.1 x 5.5	$399
Remanco Corp. (213) 227-9300	PC/XT Color & Monochrome	8088	MS-DOS 3.1, Xenix	640K bytes	360K bytes	20M bytes	4.77	8	0	1	19.6 x 19.1 x 5.5	$880-$1,160
Samsung Computer International Co. (818) 284-1680	XT Compatible	8088, 80286	MS-DOS 3.1	640K bytes	360K bytes	20M-30M bytes	4.44	8	[illegible]	1	16.6 x 16.1 x 5.5	$699
Sanyo Business Systems Corp. (201) 440-9300	MBC-[illegible]	8088	MS-DOS [illegible]	512K bytes	360K bytes	NA	4.77-8 selectable	3	1	1	17.24 x 13.24 x 6.8	$799
	MBC-[illegible]	8088	MS-DOS 2.1	256K bytes	360K bytes	NA	4.77	3	1	1	14.1 x 12.0 x 7.8	$1,199
Selva Computer Products (213) 380-8828	ST Turbo	8088-1 or V20	MS-DOS 2.0-3.2	1M byte	360K bytes-1.2M bytes	—	4.77-10 selectable	8	1	1	18.6 x 18.1 x 5.5	$600-$700
SI Micro (415) 929-1405	SI Turbo XT Mode [illegible]	8088-2	MS-DOS 3.1	640K bytes	360K bytes	20M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$895
Sharp Electronics Corp. (800) 526-0264	PC-7100	8086-2	MS-DOS 2.11	320K bytes	360K bytes	20M bytes	7.37	2	1	1	16.0 x 6.3 x 8.5	$2,795
[illegible], Inc. (213) 644-1140	[illegible] XT	8088-2	PC-DOS	640K bytes	720K bytes	NA	4.77-8 selectable	6	0	1	19.5 x 17.5 x 6.0	From $695
Supreme Technology Corp. (408) 437-1306	STC Laser PC 1988	8088	MS-DOS	640K bytes	360K bytes	20M bytes	4.77-6 selectable	8	1	1	19.6 x 16.3 x 5.5	$575-$870
Supreme USA Inc. (714) 739-0100	[illegible]	8088	MS-DOS	640K bytes	360K bytes	20M-140M bytes	4.77-8 selectable	8	1	1	19.6 x 16.1 x 5.5	$799-$1,595
Talbott Development Corp. (702) 799-8815	XT [illegible]	8088	MS-DOS, PC-DOS	640K bytes-5M bytes	360K bytes	20M-42M bytes	4.77-8 selectable	8	2	2	19.5 x 16.0 x 5.5	$732-$1,002
Tandon Corp. (818) 993-6644	PCX	8088	MS-DOS [illegible]	256K-640K bytes	360K bytes	10M bytes	4	6		1	Standard	$1,199
	PCX	8088	MS-DOS 3.1	256K-640K bytes	360K bytes	20M bytes	4.77	6	1	1	Standard	$1,399
Tandy Corp. (817) 878-4969	Tandy 3000 HD	80286	MS-DOS 3.2	512K bytes-1M byte	360K bytes	20M-40M bytes	4-8 selectable	7	0	1	17.0 x 15.6 x 6.13	$1,699-$3,499
Tatung Co. of America Inc. (213) 979-7055	[illegible]	8088	MS-DOS	256K-640K bytes	360K bytes	NA	4.77-8 selectable	4		1	[illegible]	$769
Technoland, Inc. (800) 222-3876	Technoland X Turbo	8088-2	MS-DOS	640K bytes	360K bytes	NA	8	8	0	0	Standard	$575
Telex Computer Products Inc. (918) 627-1111	[illegible] Workstation	[illegible]	MS-DOS 3	256K-640K bytes	360K bytes	[illegible] bytes	8	7		1		Contact vendor
Texas Instruments Inc. (800) 232-3200	Model 943 Workstation	8088	MS-DOS 3.2, TI 931 terminal emulator	256K bytes	360K bytes	—	4.77-6 selectable	5	1	1	17.32 x 16.54 x 6.2	$1,495
True Data Products Inc. (617) 278-6555	[illegible]	8088	MS-DOS 3.1	640K bytes	360K bytes	20M bytes	4.77-8 selectable	8		1	[illegible]	$1,039
Ultra Corp. (314) 621-4999	The Ultra Turbo Ten	8088-2	MS-DOS	256K-640K bytes	360K bytes	NA	4.77-10 selectable	8	0	1	19.6 x 16.1 x 5	Contact vendor
Ultra Tech Distributed (714) 241-1011	[illegible]	8088	MS-DOS 3	256K-640K bytes	360K bytes	20M bytes	8	8		1	19.6 x 16.1 x 5.5	Contact vendor
	[illegible]	8088	MS-DOS 3.1	640K bytes	360K bytes	20M bytes	8			1		Contact vendor
[illegible] Corp. (800) 347-8362	PC MT	8088	MS-DOS 3.2	256K-640K bytes	360K bytes-1.2M bytes	20M bytes	7.16	6	1	0	18.0 x 18.5 x 6.0	$2,595
United Computer Resources (213) 627-5454	[illegible]	8088	MS-DOS 3	640K bytes	360K bytes	20M bytes	8	8			19.6 x 16.1 x 5.5	$795-$1,200
USA Electronics (213) 390-0212	Super Turbo XT	8088-2	MS-DOS 3.2	640K	360K bytes	20M bytes	8	8	1	2	19.6 x 16.1 x 5.5	$649-$1,800
USA Micro Inc. (800) 654-5426	[illegible] XT	8088	MS-DOS 3.1	256K-640K bytes	360K bytes	20M bytes	4.77-8 selectable	8	—	1		$495-$1,246
US [illegible] Corp. (818) 333-6003	USI-8077	8088	MS-DOS 2.0 or higher	256K-640K bytes	360K bytes	0-40M bytes	4.77-10 selectable	8	0	0	19.6 x 16.1 x 5.5	Contact vendor
	[illegible]	8088	MS-DOS [illegible] or higher	256K-640K bytes	360K bytes	0-40M bytes	4	4	[illegible]	0	19.6 x 16.1 x 5	Contact vendor
Vendex Pacific Inc. (516) 482-4256	Vendex Turbo 888 XT	8088-2	MS-DOS	512K-640K bytes	360K bytes	NA	4.77-8 selectable	7	1	1	Standard	$995-$1,295
Victor Technologies Inc. (408) 438-6680	VPC	8088	MS-DOS 3	640K bytes	360K bytes	30M bytes	8	5	1	1	[illegible]	Contact vendor
	[illegible]	8088	MS-DOS	640K bytes	360K bytes	NA	4	4	1	1	—	$799
Video Technology Computers Inc. (312) 272-6760	Laser Compact XT	8088-2	MS-DOS, GW Basic	512K-640K bytes	360K bytes	NA	4.77-10 selectable	1	1	1	14.6 x 12.5 x 3.8	$695
VPC Computers (800) 222-5657	[illegible]	8088	MS-DOS, PC-DOS	256K-640K bytes	360K bytes	30M bytes	4.77-8 selectable	8	1	1	19.6 x 16.1 x 5.5	$599
Western Computer (714) 553-1660	Western XT Turbo	8088-2	PC-DOS 2.1, MS-DOS	640K bytes	360K bytes	20M-115M bytes	4.77-8 selectable	8	1	1	Standard	$876
Wyse Technology Inc. (800) GET-WYSE	[illegible]	8088	MS-DOS	256K-640K bytes	360K bytes	10M-20M bytes	4.77-9.54 selectable	2	2	1	Standard	$1,199-$1,999
Zenith Data Systems (800) 842-9000	Z-148 Desktop System	8088	MS-DOS	512K-640K bytes	360K bytes	0-20M bytes	4.77-8 selectable	3	1	1	16.0 x 16.1 x 4.8	$1,299-$1,899
	Z-181 Portable	80C88	MS-DOS	640K bytes	720K bytes	NA	4.77-8 selectable	0	1	1	13.0 x 11.6 x 3.1	$2,399
	Z-158 Desktop Series	8088	MS-DOS	512K bytes-1.2M bytes	360K bytes	0-20M bytes	8	[illegible]	1	1	—	$1,449-$2,399
	Z-183 Portable	80C88	MS-DOS	640K bytes-1.2M bytes	720K bytes	10M bytes	4.77-8 selectable	1	1	1	13.4 x 13.6 x 3.65	$3,499
[illegible] (213) 493-[illegible]	[illegible]	8088	MS-DOS	256K-640K bytes	360K bytes	20M bytes	4.77-8 selectable	8	1-4	1-2	Standard	$700
Z Technology Systems (415) 968-3300	ZTS XT Turbo	8088	MS-DOS 3.1-3.3	640K bytes	360K bytes	20M bytes	4.77-6 selectable	8	2	2	Standard	$595

like the Micro Channel must be tempered by the reality of developers' ability to deliver.

Even though most software is currently written in machine-independent languages such as C, large software systems must often be tuned to take advantage of specific hardware and operating system characteristics. This can represent a large part of the development effort.

Most application software available today is tuned for high performance on ordinary PC- and AT-class machines. Tuning software for optimum performance on 386-based machines will require major revisions. Further revisions will be necessary to exploit the Micro Channel, the new versions of MS-DOS and PC-DOS and the Presentation Manager.

Keeping up with IBM's new hardware and operating system is not the only challenge confronting software developers. Consider the following:

- PCs, XTs and ATs, as well as clones and compatibles, make up a huge installed base. Users of these machines are going to demand the same functional improvements to application software that users of the new machines have, and independent software developers that make money based on the amount of software they sell are going to want to cater to the greatest pool of users.
- Application software developers that tune their software to take greatest advantage of the Micro Channel will be shutting out a huge market of clone makers. There will be a great deal of market pressure to provide equivalent performance on software running on clone machines.
- IBM's versions of the operating system and Presentation Manager will be different from those running on clones and compatibles. Developers will have to adapt their software to run on both.

Microcomputer software developers are learning what their mainframe counterparts already know: Simply developing new versions of software is no longer sufficient. Rather, they must devote resources to producing multiple versions of the same software to run on different combinations of hardware and software.

Undoubtedly, the industry will eventually reach a consensus on hardware and software standards. But what those standards will be remains unclear. "IBM's new series of personal computers has been recognized as a significant technical improvement," says Daniel Gross of New York-based Magnetic Press, Inc., "but no one is calling it a breakthrough. The day after the announcement, IBM stock barely moved on the New York Stock Exchange.

"Clearly the new computers will not spark another revolution," Gross says, "but they do indicate the beginning of a major reform in IBM's strategy and in the personal computer business as a whole. No major player in the industry is holding back any major announcements. Apple has unveiled the new Macintosh line. Microsoft and IBM have made their strategies public. The ball is now in the court of the information industry executives."

In fact, the number of opportunities for everyone — IBM, PC compatible hardware vendors, clone makers, operating system software developers and application software developers — will be enormous. In 1981, few people had heard of companies like Compaq, Lotus and Microsoft. Those who play their hands wisely today will become the Compaqs, Lotuses and Microsofts of the 1990s. •

CHOOSE THE NAME THAT COMMUNICATES QUALITY.

We'd like to pass along some data on why you should insist on a Hayes Smartmodem 1200™ or Smartmodem 2400.™

First and foremost, no one knows more about building reliable, high performance modems than Hayes. And no wonder. Hayes pioneered the personal computer modem a decade ago, and today is actually the de facto standard in computer communications with the widespread adoption of the Hayes Standard "AT" Command Set.

Second, Hayes has a long-standing and unwavering commitment to customer support, not just to service its products, but to serve as a resource for information, assistance, and technical advice for everyone from the home user to the corporate communications manager. Moreover, Hayes provides more than a warranty on the material and workmanship of its products. Hayes warrants they will perform as promised, as well.

Should you need further data to help you make up your mind, we offer this reassuring statistic: Year after year, more personal computer owners buy far more Hayes modems than any other kind.

And that may be because a Hayes modem is the only modem with the ability to transmit and receive data, and at the same time convey a feeling of peace of mind.

Hayes

WHAT TO LOOK FOR IN A DIAL-UP MODEM 1-800-822-8224

9,600 bps modem.

In a world that places a premium on fast communications, one dial-up modem is substantially faster than all the rest. Microcom's AX/9624c.

It also happens to be the most affordable modem.

The AX/9624c delivers the high throughput of leased-line modems at a fraction of the cost.

And although it is priced higher than slower dial modems, the AX/9624c saves you substantially more money on every phone call. In fact, if you use the AX/9624c for just three hours a week, it can pay for itself in phone bill savings in under a year. Using a slower modem isn't economizing, it's wasting money.

YOU GET WHAT YOU PAY FOR.

Comparative costs of sending 360,000 bytes of data over ordinary phone lines.

Throughput	Transfer Time	Cost of call ($20/hr.)
1200 bps	50 min.	$16.67
2400 bps	25 min.	$ 8.33
9600 bps	**6 min., 15 sec.**	**$ 2.08**
19,200 bps	**3 min., 7 sec.**	**$ 1.04**

Of course, you'd expect to sacrifice a lot of accuracy to go this fast.

Think again.

19,200 bps speed.

The AX/9624c provides 100% error-free communications. Which shouldn't surprise you. Because it's from Microcom, the leader in error-correction technology and the inventor of Microcom Networking Protocol (MNP). The recognized industry standard.

That's an important advantage over other "high-speed" modems, which use proprietary error-correcting protocols that only work when connected to the same brand. Unlike the rest, the AX/9624c is compatible with most popular modems. And with the major Value Added Networks like GTE Telenet,® UNINET,® GEISCO® and the IBM® Information Network. So you can communicate at high speeds, with no mistakes, with almost anyone.

Because it's not just how fast you go. It's how you go fast.

The AX/9624c. Everything you're looking for in a modem.

- *AT-compatible*
- *Synchronous/asynchronous*
- *CCITT V.29 & V.22 bis-compatible*
- *MNP Class 6*
- *Built-in compression*
- *Rack mount available*

WHO SAYS YOU CAN'T HAVE IT ALL? Send for complete details on the AX/9624c. Just fill this out and mail it to: Microcom, 1400A Providence Highway, Norwood, MA 02062.

Name _____ Phone _____

Title _____ Company _____

Address _____

City _____ State _____ Zip _____

MICROCOM™

INVENTORS OF MNP

SYSTEMS & PERIPHERALS

HARD TALK

James Connolly

Hypers put in hot spot

One way to tell how hot a segment of the computer industry might be is to see how hard the marketing types hit it. Supercomputing must be very hot because the smiling, smooth, snake-oil types have drifted out of the comparatively mature microcomputer field to talk about parallel computing, data flow and number crunching.

Evidence that supercomputing has crossed the threshold into "hot" was seen at the International Conference on Supercomputing held in Santa Clara, Calif., earlier this month. That conference and the accompanying World Supercomputer Exhibition provided a wonderful opportunity for thousands of supercomputer users to get together for brain-picking and view varied supercomputers and minisupercomputers at a single site.

That idea worked well. The supercomputer industry has succeeded beyond anyone's reasonable expectations and has spawned a spin-off field of minisupercomputer makers that

Continued on page 59

Ryder ready to roll pilot project

System/36s bound for 126 U.S, Canadian offices to handle DP, tie sites

BY JAMES CONNOLLY
CW STAFF

MIAMI — Six years of planning and 850,000 lines of programming are set to bear fruit in the coming months as one of the largest-ever IBM System/36 projects moves into the pilot phase prior to a 126-system rollout early next year.

With that rollout, Ryder Truck Rental, Inc. will wrap up a project — tied to corporate growth plans — born before the System/36 was announced and spanning two generations of the often-controversial minicomputers — a product line that Ryder is confident will serve it well.

The System/36s are slated to handle all of the DP needs — including accounting, personnel and sales applications — of 126 Ryder district offices in the U.S. and Canada. In addition, the minicomputers will exchange information on a polled basis with Ryder's IBM 3084 and Amdahl Corp. 5860 mainframes.

Complex operation

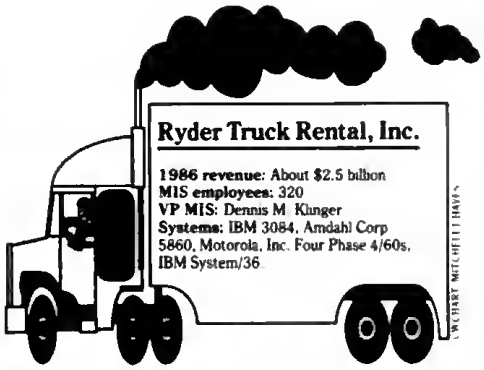
"I don't know of anyone who is doing anything bigger on the System/36, given the size and complexity of the application," says Dennis M. Klinger, vice-president for MIS at Ryder Truck Rental, a $2.5-billion division of Ryder System, Inc.

"The net result I hope to achieve is to accommodate many of the new products we've added since the installation of the old system, while keeping our costs from going up. When we built the old system, we had maybe four or five products. Today, we have 20 or 25," Klinger says.

When asked about other customers' criticism of the System/36, particularly in office automation, and questions about IBM's commitment to the system after the 1986 debut of the mid-range IBM 9370, Klinger notes the System/36 won Ryder's benchmark competition. He also emphasizes that Ryder's system will be oriented toward data processing rather than the office, and that Ryder has no desire to move IBM 370 applications — and support personnel — into its districts for a 9370.

"We are happy with the System/36, and I feel we will be happier as time goes on," says Klinger, who admits he has been kept informed of some IBM mid-range plans but will not publicly speculate about product directions. He notes that MIS had the backing of Ryder planners who were willing to look years ahead rather than at the short term.

Ryder's district automation began in 1978 with installation of minicomputers sold by Four Phase Systems, Inc., which was later acquired by Motorola, Inc.



Klinger stresses that the Four Phase processors ran well, but Ryder's growth in an era of trucking deregulation led to a search for long-term solutions and a request for proposals in 1981.

"Three or four companies, including Motorola, submitted proposals, but we decided the technology we wanted to base our future on wasn't there yet," Klinger says. Ryder postponed major acquisitions, upgraded some Four Phase systems and augmented the minicomputers

Continued on page 58

Apollo hits high-end 3-D arena

BY NINAMARY BUBA MAGINNIS
CW STAFF

The Apollo Computer, Inc. DN590 Turbo, a high-performance three-dimensional graphics workstation, has given beta-test user TRW, Inc. top performance, according to a manager with that company.

"This is the best one in their line. We have not had a failure yet," says Tom Heim, manager of TRW's engineering and computer center. TRW's electronic and defense sector, based in Redondo Beach, Calif., has had the DN590 Turbo workstations for six weeks, Heim says.

Heim made his observations on the DN590 while one of Apollo's competitors answered Apollo's performance claims for the workstation introduced this month [CW, May 11].

"Its graphics performance is

Continued on page 60

Inside

- Siemens enhances its IBM-compatible mainframe-class laser printers. Page 61.
- Star Technologies offers an interface to link its array processors to DEC's VAXBI. Page 62.
- EMC introduces an intelligent disk controller for Wang computers. Page 63.

SYSTEM 2000® DBMS for Only $12,000

All the Extras Without the Extra Costs

You don't have to spend a bundle to get a full-function data base management system. For a first-year fee of $12,000, SYSTEM 2000® DBMS gives you:

- an integrated data dictionary
- on-line query/update
- a report generator
- relational data base access
- programming language interfaces
- high-quality training and technical support.

Renewal rates are even lower. Plus, you can now link SYSTEM 2000 DBMS with the SAS® System of software to build data bases, store and retrieve data, merge and manipulate data, perform your analyses, and produce reports and presentation graphics. You can even give Information Center users access to your DBMS through easy-to-use SAS menus.

Before you invest a bundle, find out why SYSTEM 2000 DBMS is the most economical data base management system in the industry.

SAS and SYSTEM 2000 are registered trademarks of SAS Institute Inc., Cary, NC, USA.
Copyright © 1986 by SAS Institute Inc., Cary, NC, USA.

SAS Institute Inc.
Box 8000, SAS Circle
Cary, NC 27511-8000
(919) 467-8000 Telex 802505

Ready to roll

CONTINUED FROM PAGE 57

with personal computers

The districts act as independent businesses, managing more than the daily rental of bright yellow trucks for household moving. They handle long-term commercial truck leases, packing and moving services, freight hauling, leasing of drivers, vehicle maintenance and new car transportation.

Each district brings in $25 million to $50 million in revenue and has 25 to 30 computer users — who have enough computer experience to make the System/36 transition easier than a first-computer installation. Other Ryder divisions are active in public transit, school bus services, aerospace and insurance

By 1983, technology demanded another look, Klinger says. In this case, approximately four vendors made strong proposals and were invited to participate in a benchmark competition. Vendors were scrutinized in areas such as support and product direction. One surprise was that the System/36 not only scored well in product direction but also won the benchmark with the best price/performance. "It wasn't just a matter of saying this box is good for what we are doing. We had to look at where each company was going — and things such as whether we could get software," Klinger says

By the end of 1984, Ryder had chosen its hardware and formed a team to examine user requirements for software. "We spent almost all of 1985 working with our field people, our business people," Klinger says The company appointed a director of MIS field services, Al Benkert, to head the $29 million project, and system development began.

FOR RYDER, the strengths of the System/36 include the integration of data base structures in the processor and the ability of non-MIS personnel to run the system.

"We're now in the final throes of coding. We expect to complete that in May, which will take us through component system testing, although not integration testing. Then we have to go about putting it all together and making it work here at headquarters before we put it into a district as a pilot test," Klinger reports. The pilot site is likely to be Miami because of its proximity to the 320 MIS personnel at headquarters.

System development is being handled by Ryder personnel as well as contractors from three consulting firms: PDA, Inc. in Overland Park, Kan.; Centurion Systems, Inc in Stone Mountain, Ga.; and Auxton Computer Enterprises in Maitland, Fla.

While most System/36 projects are based on RPG II, Ryder's systems are written primarily in Cobol. Ryder had Cobol programmers on staff and found Cobol performance was comparable with RPG.

For Ryder, the strengths of the System/36 include the integration of data base structures in the processor and the ability of non-MIS personnel to run the system. The System/36's drawbacks, according to Klinger, include deficiencies in backup abilities, which he expects to improve before the rollout.

While IBM's marketing efforts have emphasized the System/36 as an office automation system — and the product's critics do question its ability to handle tasks such as heavy word processing loads — Ryder's office needs in the districts are secondary to more traditional DP requirements. "We might hang a few PCs of the System/36s for word processing, but even then, most of the word processing would be done on the PCs," Klinger says. In addition, the System/36 is not seen as a means to off-load tasks from the mainframes. Ryder's strategy is to keep corporate-level applications, such as major planning and modeling jobs, nationwide dispatch, financial management and personnel records, on the mainframes.

At the district level, the System/36s will handle daily administration, maintenance records, sales support, limited personnel records and the truck rental process. The mainframe-to-mini communications will come into play in uploading information such as employee time records and financial data, or downloading software and moving data among districts. A truck leased in one district might be repaired in another. Relevant records will be sent from the System/36 in the district providing the service through the mainframe to the original district.

The System/36 will also be used in some areas to support Ryder's first rental-counter automation, handling reservations and rentals on-line.

"The systems won't just change the way things are done. They will provide opportunities. What we are providing is a capability, but what we have to be careful of is not trying to force it on people all at once," Klinger says, noting that projects such as the rental-counter automation will be phased in.

Benkert notes that one of the challenges for developers has been keeping consistency in how the various applications, designed by different developers, appear to the end users. "To the end user, the system has to look like a single entity, and to do that, we have to keep the communication lines open between the different personnel," Benkert says.

Case History #60341

"Arco Petroleum Products comes to mind," said Bill Kilpatrick, of The Software Works! of Glendale, California. "It was a big project. Arco had already been through two expensive failures with other companies who could not deliver the custom software they needed It was a Point of Sale system, a cash register interface and custom-accounting software for their entire franchised chain of convenience stores, gas stations and auto tune-up centers. It had to be done fast and it had to work. Our competition proposed a dBASE III+ solution. We proposed DataFlex. I said, 'I'll make a challenge, if we can't deliver the completed project faster using DataFlex, following the exact specifications that have already been laid out, then Arco doesn't have to pay us a dime.' We knew we could do the job right and we knew we could do it faster with DataFlex"

A Powerful 4GL Speeds Development

"DataFlex is an ideal language for rapidly-turning system specifications into software solutions that really work," said Kilpatrick. "I really like the fact that the actual data entry screens are part of the program itself It is very useful in writing programs This capability has also helped us to quickly write comprehensive user documentation. Speed and accuracy of development is very important to us. Features like the macros, the program generator and report generator enable us to do more, using less code, in a lot less time."

Take the first step to more efficient program development today. Return the coupon below for your free DataFlex Demonstration Diskettes.

"There's no question about it...DataFlex has won us major contracts."

Bill Kilpatrick, The Software Works! of Glendale, CA

DataFlex is a Registered Trademark of Data Access Corporation
dBASE III + is a trademark of Ashton-Tate

FREE SELF-RUNNING DATAFLEX DEMO (PC-DOS/MS-DOS ONLY)

Find out more about DataFlex's ease of use and programming power Mail this coupon today for your free self-running demonstration diskettes.

Name _____
Company _____
Address _____
City _____ State _____ Zip _____
Phone ( ) _____
How many computer systems are in use at your company? _____
Do you use a Local Area Network or Multi-User computer? _____
Will you be running the Demo off a hard disk? _____

Data Access Corporation, 14000 S W 119 Avenue, Miami Florida 33186

CWRLD525

Data Access Corporation
14000 S.W. 119 Avenue
Miami, Florida 33186
(305) 238-0012
TELEX 1690251 Data Access C
FAX (305) 238-0017

Hypers

CONTINUED FROM PAGE 57

could prove still more successful. As any conference's organizers would hope, attendees shared ideas during sessions and over coffee. Some extremely bright users also could be heard having intelligent conversations with equally intelligent systems designers at vendor exhibits.

But it was comical to watch when those users would be cornered by the marketing people stalking the show floor. The marketers — perfectly dressed, smiles pasted to their faces — would stretch out their tentacles and grab innocent victims.

They would wave glossy product brochures and spout the same type of drivel that they dumped on MIS managers at past National Computer Conferences and on personal computer dealers at past Comdex shows.

Step right up, folks . . .

That spiel typically started with a question about whether the victim had heard about the vendor's new product and followed with a rehearsed, five-minute lecture on how supercomputing is the wave of the future. It should be recognized that some marketing people know their products and do a good job. But the ones under discussion here are those who probably were selling ocean-view house lots in Nebraska two years ago.

Many of those supercomputer users have spent their lives in university and government research centers and haven't been exposed to such tactics. But it is a sure thing that few needed to be sold on the concept of supercomputing. In some cases, they were the ones who had developed the theories on which the vendor's products or competing products are based.

The marketer was wasting time trying to dazzle those attendees with buzzwords and techno-speak.

So, the typical conversation ended with the bored user asking just one technical question about system architecture or about a modeling application. The question would leave the marketing type stammering and stuttering in an attempt to find a memorized answer or, preferably, another victim. The user was then free to look for someone in the vendor booth who knew what he was talking about.

It is unlikely that there has been another computer show at which the huckster's have been so out of place and so often put in their place. It was refreshing to see and offers hope that it can happen again at future conferences — supercomputer or otherwise.

Connolly is *Computerworld*'s senior editor, systems & peripherals.

Do-it-yourself lab testing

BY JAMES CONNOLLY
CW STAFF

Usability laboratories have been utilized by computer makers for several years, but it is still uncommon for user companies to run their own video camera-equipped test labs.

Ryder Truck Rental, Inc., now in the midst of its biggest MIS project, is using such a lab to test equipment and applications being developed for an IBM System/36-based district-automation project. The lab is now a permanent fixture at corporate headquarters.

MIS and human resources officials recently completed their first tests of the facility. About 15 members of the team watched on closed-circuit television as workers in another room tested keyboards customized by three vendors.

Cameras simultaneously focused on employee faces and hands, while microphones picked up comments about the keyboards. The feedback helps project managers know, for example, whether function keys are in the right locations or whether commonly used keys require unnecessary hand strain.

Future sessions will explore whether non-MIS employees easily understand various applications. "We are not going to be able to do every application, but there are some things we will want to get user feedback on," says Dennis M. Klinger, vice-president for MIS at Ryder. He says the observers include people who log employee mistakes, facial expressions and comments as they work with an application or piece of hardware.

Ryder's plans include relocating cameras from floor-standing tripods to less-intrusive wall mounts and redesigning the lab as an office.

The usability lab is only one way Ryder is keeping users involved in the System/36 project. System developers have gone repeatedly to branch locations for input on user requirements. In addition, Ryder transferred non-MIS users from districts into headquarters. Those users provide day-to-day input as applications are developed.

NETSERV'S

SUPERSESSION™ WINS BATTLE FOR VTAM MULTI-SESSION SUPREMACY!

In a bold move to establish the clear superiority of NETSERV's SUPERSESSION Multi-Session Terminal Manager over a leading competitor, a head-to-head test and evaluation was waged at one of the competitor's customer's sites. From the start SUPERSESSION asserted its dominance.

SUPERSESSION used approximately 23% less CPU cycles per transaction and required 30% less working storage than the competitor.

SUPERSESSION handled 100, 200, 300, 400, 500 physical terminals with ease, with 2000 virtual sessions in a single region, while the competitor, even with 31 bit addressing, was not able to support even 100 physical terminals with four sessions each!

SUPERSESSION began the evaluation round with another relentless barrage

POW! **Vastly superior procedure language for customizing all system functions!**

POW! **Multi-session support for 3270 printers!**

POW! **Screen print from any session**

POW! **3270 buffer manipulation for automated multi-session data entry**

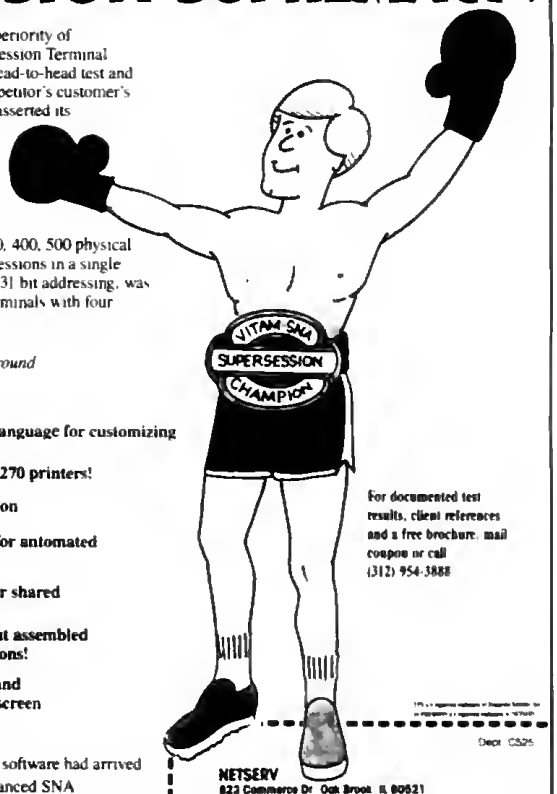
POW! **IMS/DC session services for shared terminal connections**

POW! **Easy administration without assembled tables and terminal definitions!**

POW! **Dynamic reconfiguration and monitoring through a full screen operator interface**

Clearly, the end of an era was at hand.
The second generation of multi-session software had arrived.
Our users include many of the most advanced SNA installations in North America. Join our winning team today!

NETSERV
The VTAM Networking Specialist
823 Commerce Drive • Oak Brook, IL 60521



For documented test results, client references and a free brochure, mail coupon or call (312) 954-3888

Dept. CS25

NETSERV
823 Commerce Dr. Oak Brook, IL 60521

Please rush me free SUPERSESSION / HOSTGATE PLUS brochure.
Also send facts on IMSGATE, the cost-effective solution to IMS / DC dial-in access.

Name
Company
Address
City/State/Zip
Phone

Apollo hits

FROM PAGE 57

in the range of all contemporary graphics engines, but it's laid in Apollo's Domain environment, which I think is superior to everybody else's environment," Heim adds, comparing the Apollo products to Mountain View, Calif.-based Silicon Graphics, Inc. and Hewlett-Packard Co.

"Getting graphics performance in the Apollo architecture is what sets it apart from everybody else," he observes.

Meanwhile, beta-test user Bob Laurila, a TRW computer-aided engineering specialist, says the Apollo DN590 is comparable to HP's workstation.

HP model 'a hair faster'

"In general, the Apollo is better. The operating environment provides faster disk-access. If you're starting from scratch on a model and pull it off a disk, the Apollo will beat HP on the same model. But if you're talking pure graphics, I'd say the HP is just a hair faster, but not all that noticeably," Laurila says.

The DN590 Turbo is Apollo's first entry in the high-end, 3-D graphics arena and offers a standard 24-bit plane for accessing 16.7 million colors simultaneously

Silicon Graphics' Iris 4D/60 workstation offers users an 8-bit plane standard for 256 displayable colors, with a $4,000 red-blue-green color option for the remaining 16 bits, says Deepak Natarajan, Silicon Graphics' Iris 4D/60 product manager.

However, Natarajan notes that the Iris machine is available with standard 16-bit planes, eight for color, four for overlay and underlay functions and four to recognize bit planes.

"Compared to the DN590, we can do something they cannot do: multimode graphics," Natarajan says. "We can display multibuffered and single-buffered modes of operation simultaneously, in up to 16 separate windows. And we support this in hardware."

Although the DN590 Turbo supports a drawing speed of 150,000 vectors/sec., compared to the Iris 4D/60's 140,000 vectors/sec., both workstations support up to 5,000 polygons/sec., according to vendor specifications.

"The extra 10,000 transformations per second are probably not visible to the user. It's like running very fast to the store and having to wait in line later. It doesn't make any difference," Natarajan says.

Apollo, HP and Silicon Graphics support a Z-buffer in hardware that enables users to solve hidden surface removal and see the front as opposed to both the front and back of a 3-D object.

HP's 350RSX workstation and Apollo's DN590 offer a 16-bit Z-buffer as opposed to Silicon Graphics' 24-bit Z-buffer, Natarajan says.

Apollo is aggressively pursuing the high-end 3-D market and has spent more than $10 million since 1986 in high-end graphics research, says Roland D. Pampel, the vendor's senior vice-president of technology and marketing.

The company plans to increase its graphics research and development staff from about 90 to 120 people in the next few months, Pampel says.

Penetrating 3-D market

Other vendors such as Natick, Mass.-based Prime Computer, Inc. are entering the high-end 3-D graphics market. Prime is reselling the Iris 4D/60 under its own label.

Apollo claims a price advantage over the other vendors. The DN590 Turbo starts at $57,900. The HP workstation is priced at $70,900, while the Silicon Graphics and Prime workstations cost $94,900.

An Apollo 3-D solids modeling system with a DN590 with 8M bytes of memory, 24-bit planes, a 16-bit Z-buffer, an FPX floating-point accelerator, a 3-D graphics accelerator and 190M bytes of storage costs $69,900.

Apollo also improved throughput and lowered the prices of its DN570 and DN580 workstations

The DN580 Turbo starts at $49,900, and the DN570 Turbo starts at $39,900.

The vendor also introduced DSP500 network servers with file-server and compute-server capabilities.

STRESS TEST.

TRUE FALSE

1. ☐ ☐ I'm eagerly looking forward to converting to IBM's new VSE/SP release

2. ☐ ☐ Based on past conversions, I'm sure everything will go smoothly and I'll have a wonderful experience

3. ☐ ☐ I enjoy working 16-hour days and seeing my family once a month

If you find yourself lying awake at night thinking about IBM's latest VSE/SP release, you're not alone. But there's a proven, cost effective alternative to endless days and sleepless nights, the MVT/VSE operating system from Software Pursuits, featuring multi path channel scheduling and 15 dynamically allocated regions. And if you can't avoid the conversion, you can still add the new industry-standard SPRI spooler to make your system faster and more flexible. Both come with all the high-performance features, 24 hour technical support, and on site installation assistance you'll ever need. Get all the facts. Call us today for more information and your FREE "DP SURVIVAL KIT." And stop worrying.

800-367-4823

Inside Calif., 800-307-0051

SOFTWARE PURSUITS

The proven alternative for VSE users.

IBM is a registered trademark of International Business Machines Corporation.
SPRI and MVT/VSE are registered trademarks of Software Pursuits, Inc. © 1987 Software Pursuits, Inc.

FIELD SERVICE AND YOUR COMPETITIVE EDGE

"We win a lot of our new business simply because Fieldwatch™ lets us provide better service."

—Lawrence F. Lis
Vice President, Customer Service
Ricoh Corporation

Find out how Ricoh and other leading corporations use Fieldwatch field service software to gain a valuable competitive edge—one that provides decision support data for management and bottom line profits as well. Call 1-800-247-1300 (617-272-4100 in MA) for our "Corporate Profiles" Series.

GROUP

The DATA Group Corporation
77 South Bedford Street, Burlington, MA 01803
West Coast Sales Office 1750 Montgomery Street, San Francisco, CA 94111

Siemens boosts printers' IBM links

BY JAMES CONNOLLY
CW STAFF

ANAHEIM, Calif. — Siemens Information Systems, Inc. has moved to improve the IBM compatibility of its mainframe-class laser printers with the announcement of two models incorporating all-points addressability (APA) and advanced-function printing (AFP) providing greater support for functions such as electronics forms and graphics printing.

The announcement of the 2200 Model 3 and 2300 Model 3 comes two years after Siemens introduced "AFP-like but not AFP-compatible" versions of the 2200 and 2300, according to Michael G. Kurz, director of marketing for Siemens' Peripheral Systems Division, the U.S. computer products arm of West Germany-based Siemens AG.

IBM compatibility

The printers were designed to be compatible with IBM 3800 printers and to be used with IBM mainframes and compatibles. The AFP software, which runs on a mainframe, provides the architecture to support features such as APA and graphics printing. APA, which is driven by a controller in the Model 3 printers, supports placement of a dot anywhere on a page for support of sophisticated graphics without the restrictions of line-oriented laser printers.

The Model 3 versions also support up to 5M bytes of printer memory, Siemens said. Kurz said that Siemens' advantages over IBM include the use of cold fusing technology in the 2200s for faster start-ups and printing on special materials.

He said Siemens also offers perf-to-perf printing, which permits printing of large graphics such as computer-aided designs across multiple sheets of perforated paper.

The 2200 prints 103 page/min. and competes with the IBM 3800 Model 6, Siemens said. The 2300 reportedly prints 206 page/min. and competes with the IBM 3800 Model 3. They are based on technology introduced by Siemens in 1976.

Kurz said the Model 2 versions remain available, and upgrade kits are available to Siemens' installed base at a cost of $40,000 for the 2300 and $30,000 for the 2200. He said the 2200 Model 3 costs $189,000 and will be available during the third quarter. The 2300 Model 3 costs $283,000 and should be available during the fourth quarter.

Siemens also announced three options for its 2200 and 2300 printers. The Printer On-line Paper Processing system reportedly allows operator-free printing of fanfold or cut-sheet paper for several hours. A typical paper handling system costs $95,000.

Siemens said it now supports magnetic-ink character-recognition printing on continuous forms through a new toner formulation, which costs $25 for a 2.2-lb bottle.

Siemens' Forms Generation System is a host-based application that allows generation of electronic forms without the need for a dedicated workstation. It runs under IBM MVS and DOS/VSE and costs $5,675.

NEED TO WRITE
A
DISASTER
RECOVERY PLAN??

DON'T REINVENT THE WHEEL..
CALL FOR YOUR FREE

PRACTICAL GUIDE
TO
DISASTER RECOVERY PLANNING

AND ASK ABOUT OUR PLANNING "KIT"

Business Recovery Systems, Inc.
1-(800)654-2493 (303)298-5320

after 30 years of working and growing to over 300 offices, we continue to successfully find the right Data Processing professionals for talent-seeking companies, and the right companies for talented Data Processing professionals. To receive our Professional Reference Guide, call, toll-free, 800-247-4881

Dunhill Personnel System

Helping keep people and companies in working order

POWER IS OUT. PER-FORMANCE IS IN.

SPRI can eliminate your report distribution problems without program or JCL changes.

If you're currently using IBM's VSE/POWER spooler for lack of a better alternative, we'd like to suggest a better alternative: SPRI from Software Pursuits. SPRI is faster, more flexible, and outperforms VSE/POWER hands down. See for yourself. Call us today for your FREE "SPRI vs. VSE/POWER COMPARISON GUIDE." Because you don't need more power, you need more performance.

800-367-4823
Inside Calif., 800-367-8051

SOFTWARE PURSUITS
The proven alternative for VSE users.

NEW PRODUCTS

Processors

Force Computers, Inc. has introduced the **RR-3 RAM/ROM** board, which is said to provide main-bus access to up to 16M bytes of memory for VMEbus-based 32-bit systems.

The RR-3 is said to accommodate static random-access memory (RAM) as well as erasable programmable read-only memory (EPROM) and E²PROM. Features include battery backup for CMOS memory chips. Memory space is partitioned into two banks in order to permit use of two different memory types.

The RR-3 is priced at $41,070.

Force Computers, 727 University Ave., Los Gatos, Calif. 95030.

Star Technologies, Inc. has announced **ST-VAXBI-I**, a 10M-byte interface said to link Star array processors to the Digital Equipment Corp. VAXBI.

The ST-VAXBI-I is said to provide an interface to any VAXBI-based VAX host operating under VAX/VMS. It includes two boards, a 50-ft connecting I/O cable and application-support software.

The ST-VAXBI-1 supports burst-transfer rates of 10M byte/sec. on a dedicated VAXBI and up to 5M byte/sec. on a shared VAXBI. Multiple-array processors may be attached to one VAX system, or multiple VAXs may share one array processor.

The interface costs $15,000 including driver and $5,000 when purchased with an array processor.

Star Technologies, 515 Shaw Road, Sterling, Va. 22170.

Triconex Corp. has announced the **621 interface module** said to allow users to combine the company's Tricon fault-tolerant controllers with Honeywell, Inc. IPC 621 I/O systems.

The interface consists of two single-board modules and the company's Model 4400 Interface Module and Field Termination Module. Each board occupies a single module slot in the Tricon controller. The 621 interface provides one parallel channel, supporting up to 13 daisy-chained Honeywell I/O racks over a total bus length of 100 ft, and two serial asynchronous interface channels that can each support up to five Honeywell I/O racks over a total bus length of 4,000 ft.

The 621 interface module is priced at $4,000.

Triconex, 16800 Aston St., Irvine, Calif. 92714.

An emulator for the Motorola, Inc. 68HC11 microcomputer, the **HP 64265A**, is now available as a subsystem for the HP 64000 and HP 64000-UX development systems from **Hewlett-Packard Co.**

Model 64265A is a nonintrusive emulator said to run at MC68HC11 operating speeds to 2 MHz. It provides an execution environment for testing and modifying hardware and software during product development.

Features include 64K bytes of emulation memory, emulation memory mapped in 16-byte blocks, simulated programming of electrically erasable read-only memory, six hardware breakpoints and symbolic addressing of all operations.

The HP 64265A emulation subsystem is priced at $13,400.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Plessey Microsystems has announced the **PME 2SB**, a dual-ported dynamic random-access memory board designed for high-density storage for VMEbus systems.

The PME 2SB is said to feature a block-transfer mode allowing transfer of paged data between the VMEbus and VME Subsystem Bus. It comes as a 1M-, 2M-, 4M- or 8M-byte board and includes data read-ahead on block transfers and pipelined address and data cycles.

An 8M-byte PME 2SB is priced at $3,990.

Plessey Microsystems, One Blue Hill Plaza, Pearl River, N.Y. 10965.

Graphics systems

Data Translation, Inc. has introduced the **DT1451** high-resolution frame grabber.

The single-board frame grabber, designed for Sun Microsystems, Inc. Sun-3 workstations, is said to include a built-in Arithmetic Logic Unit for executing math and logic operations on single or multiple 512- by 512- by 8-bit images in real time. The DT1451 is said to be capable of digitizing and displaying images in real time.

Processing functions include adding images together, subtracting images from each other, averaging images to reduce signal noise and multiplying or dividing images by a constant.

The DT1451 is priced at $2,995.

Data Translation, 100 Locke Drive, Marlboro, Mass. 01752.

Data storage

EMC Corp. has announced the **VS-IDC**, an intelligent disk controller for Wang Laboratories, Inc. VS 85, 90 and 100 computers.

The VS-IDC is equipped with a Motorola, Inc. 68000 series microprocessor and supports up to four drives. It has 64K bytes of first-in first-out memory, so the system bus can interface with Winchester

When networking means not working, here's a quicker solution.

Fibronics KNET™ Software and Fibronics K200™ Ethernet Controller The only complete software/hardware system solution that gives your PC's, graphics terminals and engineering workstations faster, more reliable and more secure access to your IBM mainframe (VM or MVS) via Ethernet LAN.

Disk-to-disk file transfer rates are as high as 100 to 110 Kbps. And, Fibronics KNET/K200 System operates within your present security parameters.

It's easy to install and maintain. The KNET/K200 System connects directly to your IBM Block Multiplexer channel and Ethernet and supports TCP/IP standards. Extensive built-in diagnostics simplify system checks to ensure maximum uptime.

The KNET/K200 System is totally supported by Fibronics International, the pioneer in vertically-integrated solutions for on-premises networks.

Fibronics KNET Software/K200 Ethernet Controller System is your best solution for turning "not working" into fast, efficient networking. And we'll prove it. Call 1-800-DOUBLER today for a "no-strings-attached", free 30-day demo. Fibronics International Inc., Communications Way, Independence Park, Hyannis, MA 02601-1892. FAX. (617) 778-0821

Fibronics International Inc
fiberoptic communications

IBM is a registered trademark of International Business Machines Corp.
Ethernet is a registered trademark of Xerox Corporation
KNET and K200 are trademarks of Spartacus Inc., A Fibronics Company

disk drives. The controller supports 288M-, 314M- and 620M-byte Winchester drives and a 76M-byte removable cartridge.

The VS-IDC comes with a power-on, activity and fault lights for monitoring board status and usage levels.

The VS-IDC is priced at $9,500.

EMC, 171 South St., Hopkinton, Mass. 01748

Control Data Corp. has announced the **FSD III**, a 9-in. fixed-storage drive.

The FSD III is said to be capable of transferring more than one million bytes of sustained data without moving the head positioner. It offers 1.03G bytes of unformatted storage capacity and features data transfer rates of 2.4M byte/sec. Data is recorded on seven disk platters with 26 heads at densities of 1,283 tracks per in. and approximately 20.25K bits per in. Average seek time is said to be 14 msec.

The FSD II is priced from $6,990.

CDC, Box D, 8100 34th Ave. S., Minneapolis, Minn. 55440

Hitachi America, Ltd. has introduced its **CDR-1503S** compact disk/ read-only memory drive package.

The package is said to feature two audio channels that allow integration of voice, music and data. It offers audio and data storage, daisy chain connection of up to four drives and 8-bit bus IBM Personal Computer interface or small computer systems interface facilities. Average access time is said to be 0.4 seconds.

The CDR-1503S is priced at $884.

Hitachi America, 950 Elm Ave., San Bruno, Calif. 94066.

Terminals

I-O Corp. has enhanced its **I-O 1181** IBM System/34-, 36- and 38-compatible video display terminal.

Enhancements include a choice of a white CRT screen, a 122-key keyboard said to be interchangeable with the 83-key keyboard, tilt and swivel radius increased to 325 degrees and an optional 5219 word processing printer port. The printer port is said to support Hewlett-Packard Co.'s Laserjet Printers.

I-O Corp.'s *I-O 1181 VDT.*

The basic screen-dump version of the terminal costs $1,070. With the 5219 word processing printer port, the terminal costs $1,995.

I-O, 2256 S. 3600 West, Salt Lake City, Utah 84119.

Printers/Plotters

Integrated Marketing Corp. has introduced the **Auto-T Switch**, a peripheral-sharing product.

The Auto-T Switch is said to be capable of connecting up to six computers to one serial or parallel printer or plotter. It automatically scans input lines and forwards data from the first computer in the queue to the printer or plotter, maintaining the connection until the operation is concluded.

The Auto-T Switch is available in various configurations of a combination of serial or parallel inputs and outputs.

Prices for the Auto-T Switch range from $149 to $249.

Integrated Marketing, Suite H, 1031 E. Duane Ave., Sunnyvale, Calif. 94086.

Interface Systems, Inc. has announced an enhanced version of its **ISI 424** desktop dot matrix printer designed for use with IBM System/34, 36 and 38 minicomputers.

The enhanced desktop printer is said to allow users to print on-demand barcode output using Code 39 and Interleaved 2 of 5.

The ISI 424 is said to be a plug-compatible replacement for the IBM 5256 and 4214-2.

It prints at 200 char./sec. in draft mode and 50 char./sec. in near-letter-quality mode.

According to the vendor, ISI 424 users are able to print solid-formed characters up to seven times larger than standard output.

The ISI 424 costs $2,950.

Interface Systems, 5855 Interface Drive, Ann Arbor, Mich. 48103

Power supplies

A series of **surge-suppression devices** has been introduced by **Sola**, a unit of General Signal Corp.

The seven-model series includes a power-control center model, plug-strip models with six outlets and duplex plug-in models with two outlets.

All models are said to offer a maximum transient current rated at 6,500 amps. Peak wattage capabilities are said to be 2.5 million for normal mode and 170,000 for common mode. All models come with a mode-indicator lamp.

Prices range from $69.50 to $179.50.

Sola, 1717 Busse Road, Elk Grove Village, Ill. 60007

National Advanced Systems

National Advanced Systems mainframes power DIALOG® — the ultimate online data bank

"The performance and availability of our mainframe computing systems are crucial to our success. National Advanced Systems AS/XL Series mainframes provide the fast, reliable access to online data bases that our subscribers demand. Because NAS offers outstanding products, such as the AS/XL, plus excellent service and support, we'd like to see the relationship continue." *Dr. Roger Summit, President of Lockheed Corporation's DIALOG® Information Services, Inc.*

Lockheed Corporation's DIALOG Information Services, Inc. provides the world's largest collection of online information. With over 120 million entries in more than 270 data bases, DIALOG is rightfully known as the ultimate online data bank. A few minutes online with DIALOG can retrieve data that would otherwise require hours of tedious search in a conventional library.

Mainframe computing is DIALOG's lifeblood. Over 80,000 subscribers worldwide rely on DIALOG to systematically access the world's knowledge base. DIALOG, in turn, relies on National Advanced Systems AS/XL Series mainframes and 7380 Disk Storage Subsystems for reliable, lightning-fast computing power.

DIALOG knows the value of peak mainframe performance from National Advanced Systems. But then knowledge is their business.

National Advanced Systems customers, such as DIALOG, buy our products because they perform. They keep them because we perform. Our mainframes and storage systems are renowned for quality and reliability unsurpassed in the IBM-compatible marketplace. We add to this exceptional value with a very simple feature. We listen. We work closely with you to provide innovative solutions that meet your unique requirements. We back up these solutions with the top-ranked service and support in the industry.

To get peak performance from your data center, write John Diedenhofen, Vice President of Marketing, MS 52, P.O. Box 7300, Mountain View, CA 94039. Or, call 415-962-6100.

The preferred choice of informed mainframe and storage systems users around the world

HP Networking. We connect offices, cities or countries. Like clockwork.

An integrated business system is only as good as its connections. To other departments or offices. Or branch offices. Or even international offices.

At Hewlett-Packard, we've spent ten years designing and supporting a wide variety of local-area, wide-area and office networking solutions. All connectible to SNA-based systems. All high-performance and cost-effective. All based on OSI industry standards—so they're all compatible with other vendors. And they'll grow as you grow.

When you consider also that these solutions come from the company that never stops asking "What if...", you may wish to make a connection with us. At 1 800 367-4772, Dept. 282Z.

HEWLETT PACKARD

Business Computing Systems

© 1987 Hewlett Packard Co IS02715

COMMANDER

Executive Information System

SEMINAR

Why are executives using EIS?

How much support does EIS require?

How does EIS integrate diverse information sources?

How easy is EIS to implement?

Dates and Locations

Atlanta GA	May 19	New Orleans LA	June 17
Austin TX	June 10	New York NY	June 2
Birmingham AL	May 21	Orlando FL	June 4
Boston MA	May 27	Parsippany NJ	May 27
Charlotte NC	June 9	Philadelphia PA	June 2
Chicago IL	May 21	Phoenix AZ	June 23
Chicago IL	June 23	Pittsburgh PA	June 18
Cleveland OH	June 16	Research Triangle Park NC	June 10
Dallas TX	May 20	St Louis MO	June 10
Denver CO	June 3	Salt Lake City UT	June 24
Detroit MI	May 27	San Antonio TX	June 11
Grand Rapids MI	June 2	San Diego CA	July 14
Hartford CT	June 4	San Francisco CA	May 19
Houston TX	May 27	Santa Clara CA	June 2
Indianapolis IN	May 27	Seattle WA	May 21
Irvine CA	June 4	Tampa FL	June 3
Los Angeles CA	May 27	Toledo OH	May 19
Memphis TN	May 27	Tulsa OK	June 24
Miami, FL	June 2	Washington DC	June 4
Minneapolis MN	May 27	White Plains NY	May 19
Nashville TN	May 28		

Commander EIS runs on IBM mainframes using VM/CMS or MVS/TSO operating systems, and on DEC VAX/VMS. The personal computer component runs on IBM PC/AT, COMPAQ DESKPRO 386 or fully compatible microcomputers with EGA and either a mouse or a touch screen.

Looking for EIS Answers?

Then come to a free Commander Executive Information System Seminar. Not only will you get practical answers, you'll see Commander Executive Information System (EIS) software in action. Demonstrations will include the Briefing Book, Investigate, Newswire, and Builder's Tools applications.

Major corporations have looked to Comshare for flexible, timely information systems for 21 years. And now they look to us for EIS software, too. More than 40 of them have selected the Commander EIS approach. With the experience we've gained from these implementations, Comshare is uniquely qualified to help you make an informed decision about EIS.

Register for the Commander Executive Information System Seminar by calling Chris Kelly at Comshare. 1-800-922-7979. Or in Michigan, 313-994-4800.

COMSHARE

1-800-922-7979

3001 South State Street
Ann Arbor, Michigan 48108

Copyright © 1987 by COMSHARE, INCORPORATED

IN DEPTH

End-user computing: Investing for high returns

Lessons learned by progressive organizations can keep a grand concept from running amuck

BY J. DANIEL COUGER

End-user computing has, potentially, the greatest impact of any development in the computer field. Some aspects of its growth, such as personal computing, are exponential and could easily continue that pattern through 1990. However, its cost is far greater than anticipated — much more than it should be. Worse yet, the obvious benefits realized in the past three years are threatened because of below-the-surface problems expanding and boiling like a volcano near eruption.

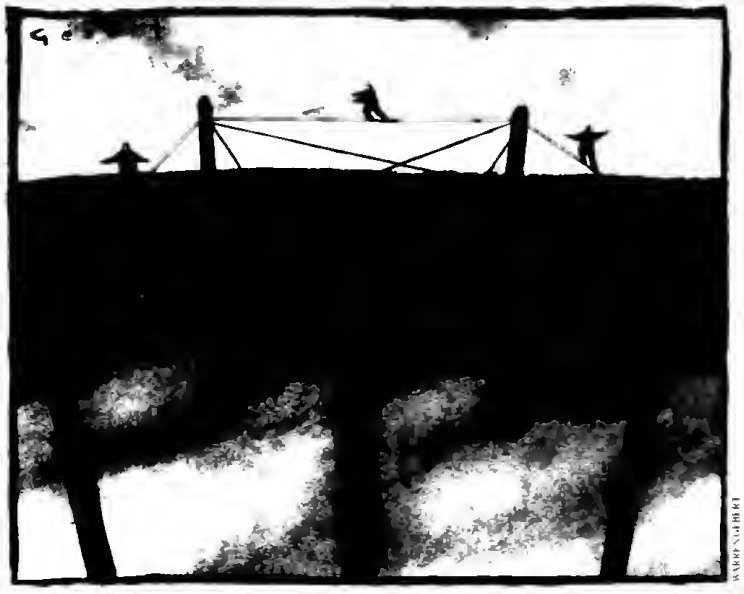
To identify the cause of these problems, 17 companies were selected for study. All had long-term computing experience and were representative of major U.S. industry categories. Eleven experienced significant problems in implementing end-user computing. Seven were overspending by a factor no less than three and as much as 10. The situation may be even worse in four other companies because they had not prepared budgets for end-user computing.

On the other hand, six firms were realizing a return on investment on the order of 2-to-1 to 6-to-1. They were realizing benefits of the magnitude of millions of dollars annually.

In the 11 problematic firms, there was a proliferation of micros and micro software, which were installed by inexperienced people — the users. The principal problem was lack of adequate planning for end-user computing. Had the firms standardized on micro hardware and software, training could have been more consistent, the learning curve simplified and downtime reduced.

However, the highest cost factor of all could not be easily ascertained. Without standardization, the concealed costs of errors resulting from the proliferation of hardware and software may exceed a company's measured excess cost.

The problems of end-user computing are not insurmountable, as shown by six of the survey companies. Analysis of their successful approaches to implementing end-user computing reveals a generic approach that will enable other organizations to leapfrog one of the three stages of end-user computing growth, which consist of interactive terminal access, information centers and end-user computing. The result is improvement in both efficiency and effectiveness.



WARREN GEBERT

Pattern for success

According to a 1983 report by Framingham, Mass.-based International Data Corp., 1.85 million personal computers were shipped in 1983. By year-end 1987, the total base of installed PCs will exceed 20 million. If the pattern of the 11 less successful companies in the survey is prevalent throughout the U.S., the result of installing 20 million micros could be chaotic.

However, the risks can be greatly lowered by following the guidelines of the six successful firms, and most companies can then expect to realize the potential of end-user computing. Those guidelines are as follows:

- Adopt a proactive rather than

This article will appear in the "Proceedings of the 1987 National Computer Conference" (Vol 56.) © 1987 AFIPS. Couger, a professor of computer and management science at the University of Colorado in Colorado Springs, will present a session "Have You Discovered the Markets for Your Information Services?" at the 1987 National Computer Conference in June.

- **Soft controls promote individual creativity**
- **Technicians see support as hand-holding**
- **Adopt a proactive approach**

reactive approach to implementing end-user computing

• Conduct cost/benefit analyses for each potential computer application.

• Provide soft rather than hard controls for acquisition and use of PCs and related software.

The study began with a review of five previous surveys on the various aspects of end-user computing. Next, the 17 U.S. firms were selected for in-depth analysis. The net annual income of each corporation ranged from $100 million to $500 million The total number of employees ranged from 3,000 to 45,000. All of the companies had experience with mainframe computers for 15 or more years. Success in end-user computing had no correlation to the size of any of the companies. The geographic distribution of the firms was fairly even.

The trend toward end-user computing has evolved from three distinct and parallel paths. All three paths provided end-user computing but to a limited degree. Only with the convergence of the three paths is the potential of end-user computing — that is, integrated end-user computing — realized.

Interactive terminal access. The earliest path, interactive terminal access, primarily provided users with information retrieval capability. Users could directly interact with a computer but only in a very limited way. Only the forerunners to user-oriented languages were available, and they were not widely used. Technical support came from the MIS personnel assigned to develop the users' transaction processing systems (for example, order processing or inventory control) rather than from a special cadre of personnel assigned exclusively to deal with users' personal computing needs.

Information centers. The second path, information centers, was the first attempt to pull together the services needed for an individual to operate with relative independence. The early information centers were physical locations to which users could go for training, technical assistance, retrieval-only access to live data bases, such as the firm's customer data base, and manipulative access (the ability to change contents) to copies of data bases.

Today, the information center is not confined to one physical location but is an MIS organization entity to provide these services to users wherever they reside. Although this is a significant improvement from the previous delivery system, information centers do not provide many of the user-friendly benefits of personal computing.

Micro computing. The third path, micro computing, is the only one of the three that emerged primarily outside of the direction of the MIS organization. The low cost of both PCs and PC software enabled user organizations to acquire these systems outside the purchase controls of MIS. The user-friendliness of these systems enabled users to operate relatively independently of MIS technical assistance. But independence was also a disadvantage. PC users rarely had access to MIS data bases. Also, most PCs were acquired without communications capability.

Integrated end-user computing. The convergent path, integrated end-user computing, not only provides the best of each of these earlier delivery services but also enhances all three. PCs that are compatible with mainframe computers can access data bases and utilize sophisticated mainframe tools as well as operate in stand-alone mode to avail themselves of the rich variety of PC software. This stage of the end-user computing evolution also includes delivery of electronic mail capability using the same PC. With this concept, office and computing activities become fully integrated. Also included in this stage of evolution is access to external as well as internal data bases.

Bridge's broadband network is the first to support TCP/IP.

Now a greater number of products from a greater number of vendors can communicate over greater distances.

And because of Bridge's unique, self-adjusting modem, your broadband network will never need tuning.

Call (415) 969-4400 for data sheets and more information

Bridge Communications. Building networks that build companies.

End-user computing advantages

The rapid growth of end-user computing is itself the best indicator of its benefits. It is obviously meeting the needs of a large body of managers and staff. Other advantages of end-user computing include the following:

• It offers simplified tools for individuals to build their own applications and models.

• It offers improved access to data bases for information retrieval and for data as input to models.

• It increases user productivity. Users are able to eliminate the time required to translate their requirements to MIS professionals for development of systems by the MIS department. They are also able to reduce implementation time by prototyping their own systems, and they can build applications tailored to their individual needs.

The principal advantage needs to be viewed from the macro perspective of the effect on management in general rather than the micro perspective of individual users. The end-user computing approach has brought a result long awaited by the computer industry — computer literacy. We are on the threshold of widespread use of the computer throughout the company.

The number of individuals directly using computers has more than doubled in the past three years in those organizations that have implemented end-user computing. On the other hand, the hoped-for level of managerial use has not been completely realized. The large user group is the professional, nonmanagerial staff. Managers are delegating the tasks of developing models to their staff and are using the systems primarily for information retrieval. To change this pattern, more

functions need to be provided in an integrated manner with more user-friendly access.

According to the surveys, few companies have formally analyzed the cost-effectiveness of end-user computing. Where the justification process for traditional MIS applications is formalized, the one for end-user computing rarely is. While each of the surveys cited benefits, few had been quantified. Why?

Surprisingly enough, the approach to end-user computing has followed the pattern of initiating computing in industry 25 years ago. In many companies, end-user computing began with a missionary thrust. The prevalent view was that converts could not be gained without providing the service to users free of charge, that is, without chargeback to their departmental budgets. Several organizations that have had end-user computing in some form for more than 20 years have not emerged from the missionary stage.

Because of the burgeoning costs of end-user computing, companies are being forced to change the "free-goods" policy and to move into Stage 2 of the traditional MIS development pattern in which chargeback occurs. In companies with a chargeback policy, the costs of computing are distributed to users according to the amount of services used.

Stage 3, where cost/effectiveness analysis occurs, will be realized when companies move to integrated end-user computing. Because of access to all computing facilities, data bases and software, a higher level of benefits and quantification is facilitated. Users can more easily assess the total effect on their jobs.

Problems on the rise

Problems are not diminishing with the widespread growth of end-user computing. On the contrary, they are expanding.

Surface issues include excessive equipment cost, inefficient users, inefficient applications and friction between the end-user computing technical staff and the rest of the MIS department. Below-surface issues include the proliferation of data bases, software products and PC machine types and the problem of interfaces between tools and developing systems that are difficult to maintain.

With inexperienced users, computing costs soar. Much of the learning is trial and error. Even with computer experience, personnel without the training of an MIS professional will be relatively inefficient system developers. In addition, the fourth-generation languages are tremendous resource-burners. That is, associated computer costs are often higher than running applications developed with procedural languages.

Computer costs to support end-user computing have grossly exceeded projections. For example, in four of the six progressive organizations in which the in-depth analysis occurred, the three-year plan called for end-user computing usage to approximate an extra shift of mainframe time; instead, an entire mainframe computer was required.

Still in the missionary stage, many companies have yet to install a chargeback system. Without a chargeback system, users have less incentive to be efficient.

Although the typical end-user computing support group reports to the MIS organization, some disruptive results have occurred. System personnel responsible for the large transaction-processing applications have complained that their user contact has been diminished by the technical personnel assigned to end-user computing. It appears that the change is not caused by the end-user computing personnel's overtly usurping that privilege but rather by the fact that users developing their own systems via end-user computing naturally spend more time with the person most familiar with end-user computing facilities.

> THE ESSENCE of end-user computing is service. Although I know of only one company that explicitly uses the slogan, "The customer is always right," that approach is the implicit objective of many end-user computing facilities.

The data proliferation problem is perhaps the most insidious and costly. Data base security procedures prevent user access to on-line data bases, except in retrieval-only mode, so they cannot alter the data. Users who want to manipulate data to perform analyses must be provided with copies of a data base. The resultant problem is inconsistency of reports when users are using data bases that are not as up-to-date as the reports produced by the transaction-processing applications.

The solution that has been used is to give everyone current data. In this mode, a "shadow" data base copy is provided daily from the corporate mainframe. While the currency problem is resolved, a significant increase in data base cost occurs.

With PCs from a diversity of vendors using different versions of software, the cost to maintain software and hardware is higher than necessary. However, at present, no single vendor meets all the needs of a customer. Different systems also complicate communication between PCs and with mainframes. In addition, some companies make available to users several fourth-generation languages, thereby causing interface problems. To interface, users must learn several sets of commands.

Some users continue to expand their application until it becomes so large and complicated that they want to transfer its maintenance to the MIS department. Because it was not developed with MIS department standards, it is difficult to maintain.

The customer is always right

It is not surprising that the variety of approaches to implementing end-user computing has resulted in a hodgepodge of hardware and software. The essence of end-user computing is service. Although I know of only one company that explicitly uses the slogan, "The customer is always right," that approach is the implicit objective of many end-user computing facilities. The goal is to undergird improvement in user effectiveness.

The emphasis on effectiveness of computer use rather than efficiency can hardly be faulted. However, it is not necessary to sacrifice one to attain the other. Satisfactory results are possible. Examples in the PC area are as follows: limiting selection to compatible PCs; standardization on an operating system (for example, a multiuser system with communications capability between PCs and to the mainframe); standardizing on application packages (for instance, a single integrated spreadsheet package and a single word processing package).

Examples of standardizing on fourth-generation tools include one language with comprehensive information retrieval capability and one language with strong modeling capabilities.

Although the move to cost/effectiveness analysis should occur as soon as possible, a chargeback system is a satisfactory interim policy. Users who must pay for their use will prize efficiency as well as effectiveness.

Improved user training programs will produce higher levels of efficiency in computer use. For example, there are many tricks and shortcuts in spreadsheet development that can be conveyed in formal training sessions. The same is true for use of fourth-generation languages.

Through improved attention to planning, the potential benefits of end-user computing are substantial.

Soft controls

Progressive MIS organizations have found that formal planning can be introduced to achieve integrated end-user computing without resorting to increased control measures. Many of the benefits of end-user computing have been the result of giving the end user the freedom to experiment with other than traditional ways to develop systems.

Prototyping is an example. It has worked so well in end-user computing that the MIS function is adopting it for developing certain types of transaction processing systems. In prototyping, a simple model is computerized and tested. Despite its simplicity, the model produces useful results. It is then enhanced and retested. Each cycle of refinement produces improved results.

Tight or "hard" controls may stifle user creativity. A better approach is "soft" controls. Examples of soft controls being adopted by progressive MIS organizations include the following:

- Providing PC maintenance for a select set of PCs, encouraging users to acquire only those PC types.
- Providing centralized purchasing to attain quantity discounts for both PCs and software while also limiting the number of PC types and ensuring compatibility.
- Providing training only on a select set of software and fourth-generation tools, motivating users to confine their activities to that set alone.
- Providing file-sharing software so that a data set developed or acquired by one user is also available to others.
- Serving as the central agency for obtaining new releases of software, then implementing them for all interested users, which will thereby reduce the possibility of incompatibility and inconsistency from multiple releases existing throughout

DOS, OS, or CICS Frustration?

BIM gets it out of your system.

BIM presents a line of proven programs that maximize your system's capabilities, saving you time, labor and expense. These program products help get the most out of your system and people.

BIMWINDOW — Multiple terminal sessions concurrently at CRT under DOS or OS VTAM
BIM-EDIT — The editor with more than 25 significant features that ICCF can't match
BIMSPOOL — Prints output in POWER/VSE spooling queue on local or remote 3270 terminal printers. (Received ICP Million Dollar Award 1982)
BIMSPOON — On-Line to Batch Print Spooling. Prints data passed from CICS application programs into the POWER spooling queue
BIM-PDQ — POWER Dynamic Queuing performance enhancement. Eliminates 85% of the I/O to heavily used POWER queue
BIM-ODIS — Comprehensive problem analysis and display of operational CICS system. DOS and OS
BIMTEXT — Word processing, document composition system. Create formatted documents from free-form input. DOS and OS.
BIMSWAP — Switch local 3270 BTAM terminals between multiple CICS partitions without special hardware or additional ports
BIMCMPRS — CICS 3270 data compression system. Reduces response time for remote terminals significantly. DOS and OS
BIM-FMAP — CICS BMS on-line map generation and maintenance. DOS and OS.
BIMECHO — Copies one CRT's output to another or printer for problem determination and demonstration
BIMP3270 — Comprehensive CRT screen image print facility. Copy to terminal printers or spool queue for system printer
BIMSERV — On-line display of library directories and entries. VSAM Catalog entries, disk VTOC's, etc.
BIMCNSOL — Multiple/Remote System Console function for CICS. Display-only or full input/display versions available
BIMMONTR — DOS/VSE System Status, Performance Measurement, and POWER Queue display
BIMSUBMT — On-line Job Edit and Submission facility

BIM programs are cost-efficient, some less than $900, highest $4800. You can save even more with our group package offerings. Products are available on permanent, annual, or monthly licenses, and shipped on a 30-day free trial basis. Product documentation is available on request.

BIM also performs systems programming consulting, with consultants based in Minneapolis and Washington, D.C. Computer time services are also available on our 4331-2 system, on-site or remote.

BIM

B I MOYLE ASSOCIATES, INC
5788 Lincoln Drive
Minneapolis, MN 55436

612-933-2885
Telex 297 893 (BIM UR)

INTRODUCING THE YOU WON'T BELIEVE TO THE AVERAGE

Fasten your seatbelts. The new Pinwriter® P9XL printer from NEC is about to take off.

It's our fastest printer yet.

Actual print sample from the Pinwriter P9XL printer

It cruises at 400 characters per second in draft mode, 140 characters per second in letter quality mode.

Which means it can really make those business letters fly. In fact, no other 24-pin printer is faster.

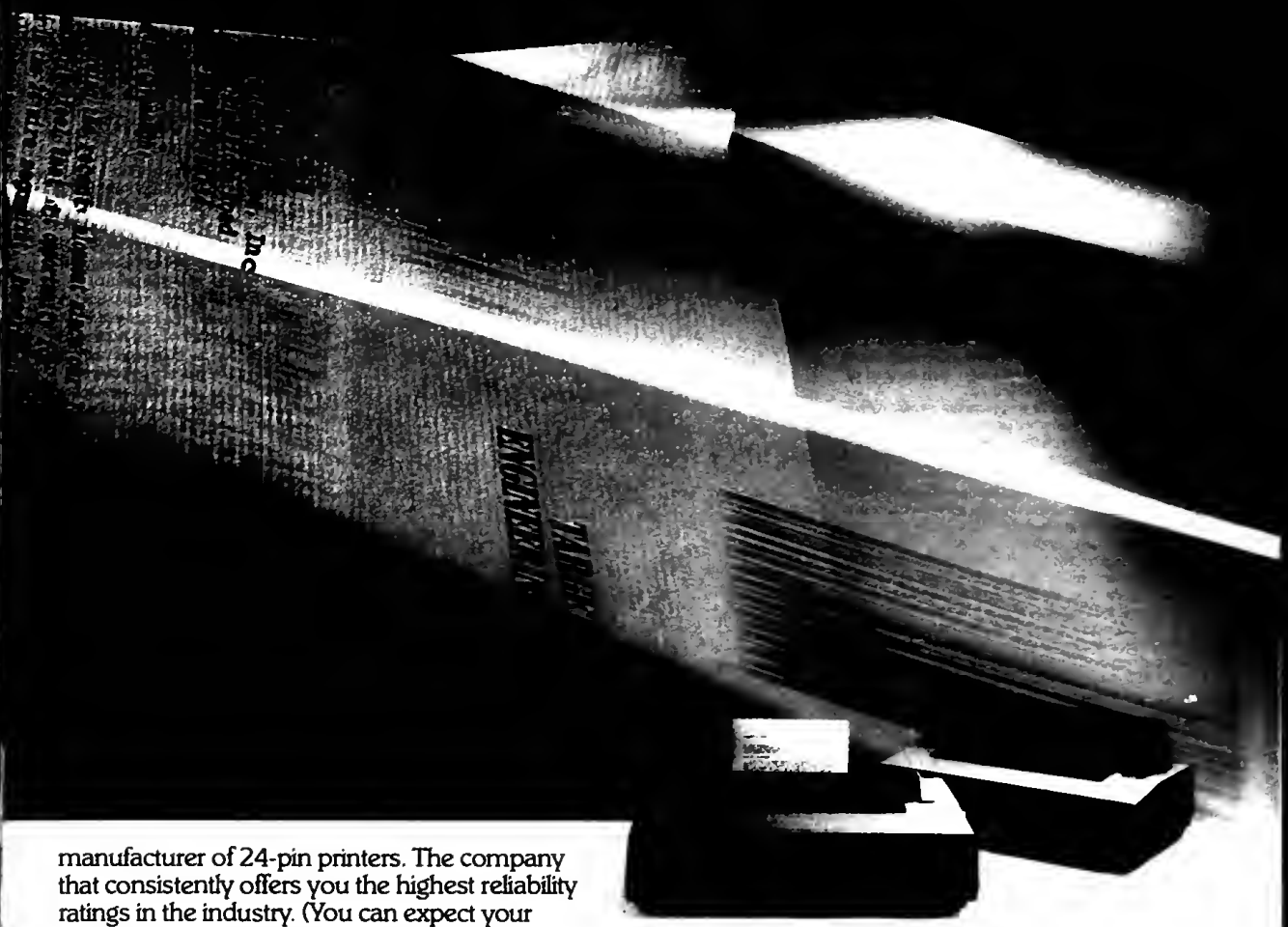
And because it uses a 24-pin printhead and a multistrike film ribbon – the same kind that's used in typewriters and letter-quality printers – the P9XL also delivers better print quality than its competitors. It even prints in color.

But it's not limited to letters. The Pinwriter P9XL is a true multi-purpose printer that can fly through payroll, invoices, continuous forms, multipart forms – just about any business or office application.

Best of all, it's from NEC – the world's largest

C&C Computers and Communications

P9XL PINWRITER.
WHAT IT DOES BUSINESS LETTER.



manufacturer of 24-pin printers. The company that consistently offers you the highest reliability ratings in the industry. (You can expect your P9XL to run for five years before it might need a repair.)

So don't waste any more time. Fly down to your nearest dealer and ask to see the new Pinwriter P9XL. Or call NEC at 1-800-343-4418 (in MA, (617) 264-8635). Or if you prefer, write to NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

NEC PRINTERS. THEY ONLY STOP WHEN YOU WANT THEM TO.

NEC

NEC Information Systems, Inc.

the organizations.

- Providing training in application development methodology to help users better manage their development projects and adhere to corporate standards of development to facilitate the maintenance of applications.
- Organizing an electronic mail system and implementing it for anyone with communications-compatible PCs as opposed to providing electronic mail only to persons with computer terminals.

Lack of a hard controls approach will not prevent companies from moving to integrated end-user computing. On the contrary, soft controls are a more practical approach because they permit individual creativity within an environment of cooperative, mutual objectives.

A MAJOR barrier is the attitude most technical personnel have toward spending a major portion of their working hours assisting users. Their terms for this activity are frequently derisive, such as "hand-holding" and "nursemaiding."

Another factor the progressive firms have in common is effective technical support. However, the key ingredient is not the availability of technical know-how; it is motivating those individuals to help end users. Some corporations with adequate technical expertise are not meeting their objectives in integrated end-user computing because of their approach to using that expertise.

A major barrier is the attitude most technical personnel have toward spending a major portion of their working hours assisting users. Their terms for this activity are frequently derisive, such as "hand-holding" and "nursemaiding."

It is not easy to find technical personnel who find such work challenging. They would rather be back in the MIS department, solving complicated hardware/software issues.

These findings are not confined to the end-user study; they are also supported by research on the behavior of computer professionals. In my book with Robert Zawacki, *Motivating and Managing Computer Personnel* (John Wiley and Sons, 1980), a data base of more than 6,000 computer personnel reveals that most of these employees have a low need for social interaction and a high need for challenging work.

This situation need not be a deterrent. Only a small portion of the MIS department personnel is required to provide the technical support for end-user computing. Those few at the high end of the continuum of need for social interaction will not be turned off by the heavy interaction required to support end-user computing. The progressive firms in the study were successful in providing effective end-user technical support because they were able to select these few personnel out of the total MIS work force.

But the selection process alone was not sufficient to ensure success. The end-user support departments of the progressive firms shared one other characteristic. In each firm, the head of that support function was able to convince technical personnel who had a strong need for challenging work that end-user computing provided unique and substantive challenges. These managers emphasized two things. First, the work is state of the art in terms of technical advances. Second, the work's impact on the company is substantial because it is managerially oriented.

In short, these successful managers of end-user computing take great care in selecting employees with the characteristics appropriate for this activity and in identifying for these employees the importance and challenge of the work.

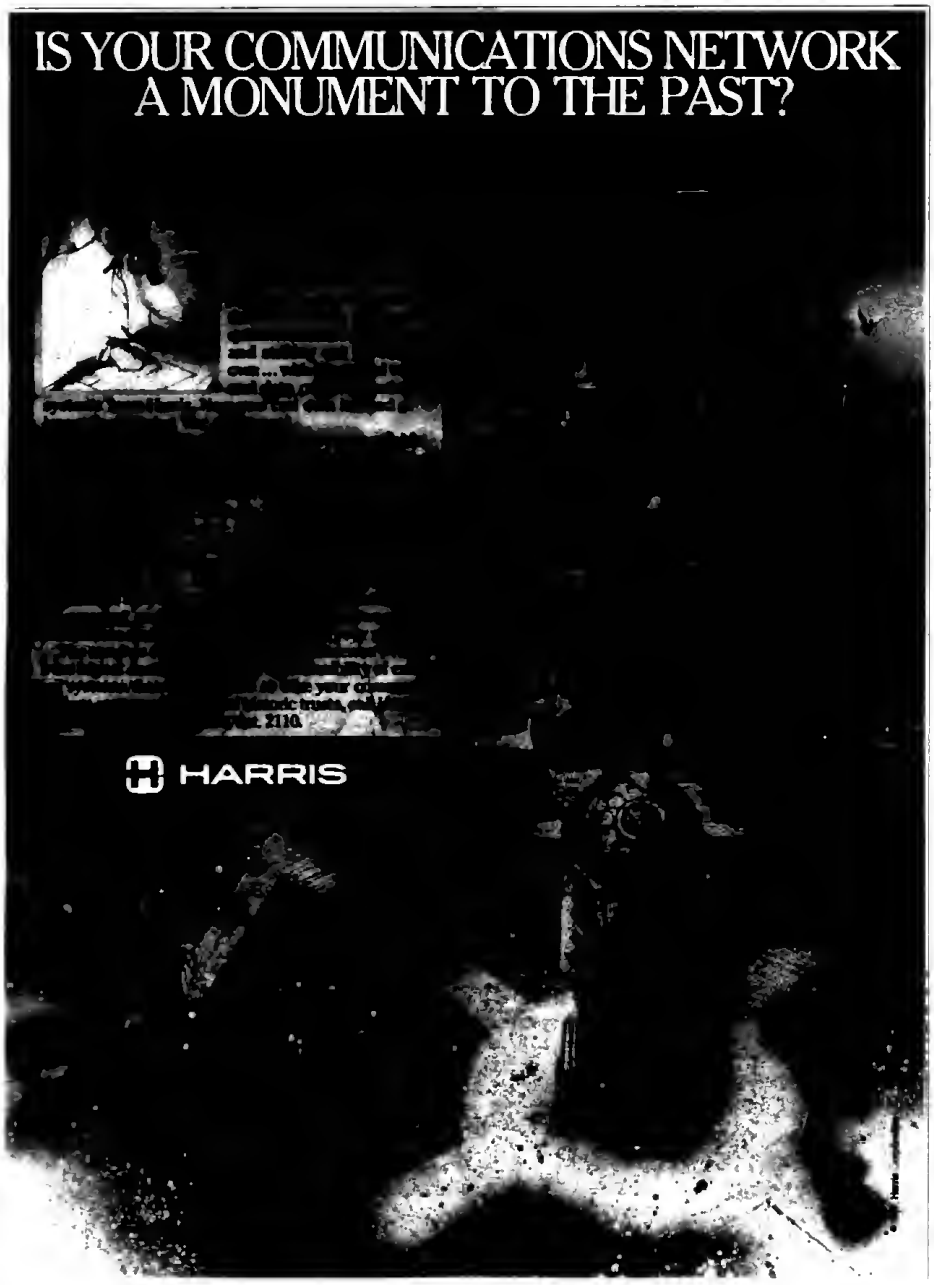
Natural progression

Integrated end-user computing is not a utopian concept. It is a natural progression from the convergence of the three prior paths of interactive terminal access, information centers and micro computing.

With integration, end users can utilize the computing power of mainframe computers in the company as well as those external to the company that use the same communications protocols. Access to internal and external data bases is also possible. Users can also communicate with other users for electronic mail, data and model sharing. They can also use personal computer software in stand-alone mode. With enhanced training and fourth-generation tools, they can construct their own tailor-made systems.

The imminent threat of high cost and inefficient resource use in end-user computing can be avoided through more precise planning for the move to integrated end-user computing. Effective and efficient use of computing resources is possible.

The planning process can be facilitated by analyzing the experience of progressive organizations and avoiding some of the inevitable mistakes that the frontrunners incur by being innovators. Through this approach, it may be possible to leapfrog a part — or perhaps an entire stage — of the typical three-stage process of evolution of end-user computing, producing a personal workstation with a variety of capabilities. •



MIS struggles to hire wisely

Is four minutes really enough time to pass judgment on job candidates?

BY ROBERT ZAWACKI

In 1986, MIS departments in most U.S. firms spent more than 40% of their total first-quarter budgets on personnel salaries and benefits. Because of the tremendous cost associated with selecting and training MIS professionals, this key function is too important to be left to the personnel department. It must be controlled and driven by MIS managers with the support of personnel.

However, my research and the research of others indicates that MIS managers either leave this critical function to the personnel department or merely pay it lip service by going through the motions themselves; these managers' ability to pick "eagles" and eliminate losers is very poor.

Further, once MIS professionals are hired, those who are marginal performers are rarely, if ever, eliminated from the firm.

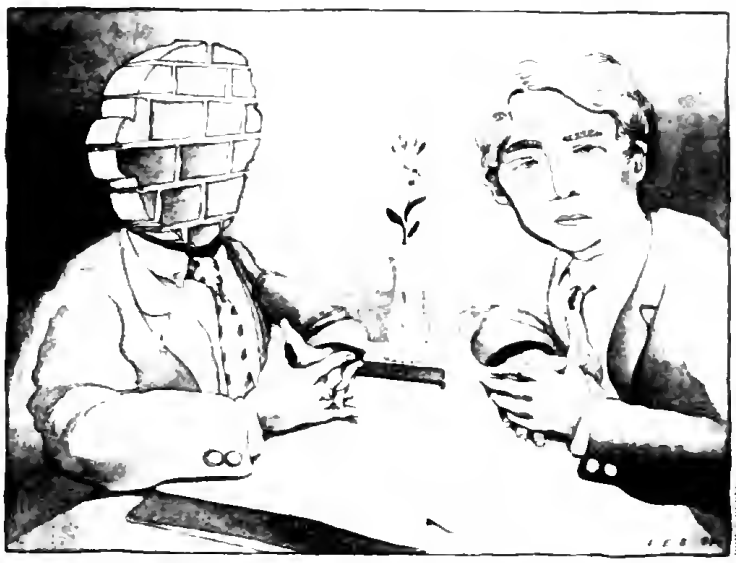
Literature, research and experience with numerous MIS organizations has uncovered a number of reasons for MIS's poor ability to select good candidates:

- Biases are established early in the interview.
- Interviewers tend to develop a stereotype of a good candidate and then match applicants with that stereotype.
- Interviewers benefit little from day-to-day interviewing.
- Because of the crisis-management, go-go environment within MIS, many MIS managers wing interviews rather than prepare and structure their questions.

Research has also shown that an interviewer's opinion of a candidate crystallizes within a mean interview time of four minutes. Often, interviewers unconsciously alter the outcome of an interview. They are influenced more by unfavorable than favorable information; rather than seek out the best candidate, they try to eliminate the worst. If the early impression is negative, then the interviewer speaks in a negative tone with the hope that the candidate self-selects out of the firm. If a candidate presents a favorable impression early on, the interviewer will be more talkative and speak in a more favorable tone.

In addition, seeing negative candidates before positive candidates will result in a greater number of acceptances than reversing this order. If interviewers keep seeing poorly qualified candidates, they lower their standards in order to make a decision quickly.

Given the pessimistic nature of the research findings, what can MIS do to choose eagles? It must consider a number of questions: What are the organization's objectives? What factors predict effective job performance? How can an MIS department structure an interview to increase its number of hits?



JOHN JONES

How high can they fly?

Intuition suggests that MIS wants all the eagles it can recruit. However, eagles are achievers and require challenging, cutting-edge work or they become dissatisfied. As MIS departments change their concentration from development to maintenance, top management should consider a mix of people to match the jobs or attempt to enrich the jobs it offers if it is to hire a high percentage of eagles.

The Hartford Insurance Group is taking steps to improve the MIS interviewing process. Bob Mayne and Bob Drouin, directors of information management at The Hartford, along with Tom Streett and Dick Benashski, representing human resources, head a team of 14 maintenance managers who are looking at the hiring and management of maintenance programmers.

The Hartford is attempting to better match employees and jobs in the selection process. The team considers what maintenance managers want out of their work and shares ideas on what good managers are doing to motivate personnel. Through brainstorming sessions, the team developed a competency model of the behaviors of effective maintenance managers.

The company uses this model to select managers with appropriate skills; it also uses it as the basis for a training program for its maintenance managers. This type of creative group behavior is needed if MIS is to increase maintenance programmer motivation and productivity.

A programmer's job performance is influenced by three factors: ability, motivation and the challenge and visibility of the job (see chart page 74). The ability

Zawacki is a professor of management and organizational behavior at the University of Colorado in Colorado Springs. He will be presenting a session, "How to Pick Eagles: Interviewing for Success," at the 1987 National Computer Conference in June.

- **Weakness lies in pinpointing motivation**
- **How many 'eagles' does an MIS group need?**
- **Preparing for a one-hour interview**

Prepping the perfect interview

Effective interviewing requires active listening. The interview should not be an aimless discussion, rather, it should be a conversation with the purpose of exchanging knowledge to gain information. The following principles are offered as a brief guide for conducting an effective interview.

Plan for the interview. What do you want to find out about the candidate? Such items of concern might be the match between the candidate's growth-need strength and the job's motivating potential score, his qualifications, attitudes, personality, communication skills, availability or relocation problems.

Be prepared. What job do you have in mind for the candidate? If possible, review the candidate's resume or application before the interview.

Be interested. Give the impression that the applicant is the most important thing on your mind. Remember that the purpose of the interview is to match the candidate you choose with your organization.

Encourage applicants to talk about themselves. Find out about the candidate's interests, aspirations and ambitions. What were an applicant's reasons for selecting a particular course of study at college? What electives did the applicant choose and why? What did the applicant like most and least about previous jobs and why? What does the applicant think are his strong points? Weak points? Encourage applicants to talk freely about what they have accomplished and the way they worked out their achievements. Note how they describe themselves.

Accurately describe the opportunities in your firm and your activity. Be careful not to oversell, and avoid making any commitment about starting salary.

Send the applicant away with a positive feeling. Whether or not you would recommend employment, this is important to your corporation's image.

Remember to listen thoroughly and critically. Ask "why" and "how." Avoid asking questions that can be answered with a yes or no. Listen, don't talk, two-thirds of the time.

Dos and don'ts

Listed below are a few dos and don'ts to keep in mind during your interviewing.

Do:

- Evaluate the applicant as an individual.
- Eliminate any stereotyped ideas based on the applicant's race, color, religion, national origin, sex, age or handicap. For example: Don't assume that women have a much higher turnover rate than men — it is not statistically true.

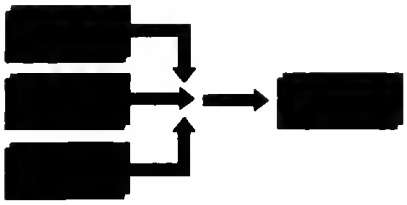
Don't ask a job applicant questions about:

- Race, national origin, religion or age.
- Marital and family status, including child-care needs.
- Plans to have children.
- Height or weight (unless this information is job-related).
- Friends or relatives working for your firm, unless you clarify the question by informing the applicant that company policy does not allow relatives of employees to work in the same cost center or in security, data processing, finance or personnel.
- Arrest records.
- The applicant's credit rating or other financial data.

ROBERT ZAWACKI

Performance factors

Interviewers need to learn more about job candidates than just their abilities in order to predict their performance



CW CHART

factor is determined by skill, education, aptitude and experience. In working with MIS organizations, I have found that managers are good at determining ability because they are aided by the candidate's resume. They can review the candidate's education and previous experience and make a sound prediction.

However, a programmer can possess all the ability in the world, but without motivation he will fail. Further, a programmer can be able and motivated; however, if the job does not challenge him or if the match between the person and the job is not a good one, that programmer will not produce to his ability.

The weakness of MIS managers in an interviewer's role lies in their inability to judge a candidate's motivation and the job's ability to challenge a candidate. Interviewers tend to focus on a candidate's ability because they are more comfortable in the technical areas — their own areas of expertise.

Predictive validity increases when the interviewer asks questions about the candidate's motivation. Good MIS professionals possess high growth-need strength (GNS), a measure of motivation and need for personal accomplishment. Prior to the interview, the interviewer should plan four or five questions that examine the candidate's need to be challenged, continue to grow, develop and move ahead. Also, the candidate's desire to continue his education is a good indicator of high GNS.

For MIS professionals, a job is challenging if it contains skill variety, task identity, task significance, autonomy and feedback. If a job is low or moderate in these five dimensions, the MIS department may decide to select a person with moderate GNS.

If MIS offers a job that is moderate in "motivating potential score" (MPS) — a measurement of a job's potential to motivate — and still decides to select an eagle, then the interviewer should represent job expectations for what they are. A company should promise only what the job can deliver. Employees with a high GNS working at a low or moderate MPS job will soon become bored and dissatisfied. These people need encouragement, joint goal-setting, career planning and increased managerial feedback; they also need more autonomy. Management can meet some of these high GNS needs by offering formal education.

The happy matchmaker

In determining a successful match between a potential job candidate and your organization, first determine how many eagles you want in your MIS department. Next, select a team of interviewers, including peers of the candidate. Line management must own and control the interview process, but a personnel specialist or psychologist can be available as support staff.

Providing training on good interviewing behavior is important. Managers should be trained to conduct an interview in a professional and timely manner. Robert Hall, senior vice-president with Prudential Asset Management Co., heads an MIS organization that matches professionals and jobs. Hall asked a committee of five MIS managers to define the abilities, skills, education and motivation they were looking for in new hires. After defining what their needs were, these managers designed interview questions to help MIS managers match people and jobs.

Each candidate should be provided one hour of interview time. Following the interviews, meet with the selection panel and pool the evaluation of all interviewers.

After determining who is the best match with the job, make a verbal offer to the candidate as soon as possible. Realize, also, that how you notify the unsuccessful candidates can effect goodwill — they may be a source of future talent. Remember, you may only hire one person, but many more may be talking about how your firm treated them.

Following the above guidelines can result in improved organizational effectiveness through a better match of your organization's needs and the ability and motivation of the employee you eventually hire. Choosing an eagle is not easy; it requires a commitment from MIS managers and peers. However, the results are well worth the effort. Either we do it right up front or we live with our mistakes. The choice is ours. •

We want to buy System 36s and System 38s and related peripherals. Call now. 1-800-528-0358, ext. 8806. Ask for Kelli.

Bell Atlantic Systems Leasing

Sales Offices in: Atlanta, Austin, Boston, Chicago, Angeles, New York, Philadelphia, Phoenix, Pittsburgh, San

Formerly Greenwood Capital Corporation

MANAGEMENT

TAKING CHARGE

Jon Pearkins

CBT courses get useful

Formal training in technical subjects for data processing personnel is a necessity, and there are some exceptional new training tools available that maximize the return on time and money spent on this activity.

Let's look at the available alternatives:

Apprenticeship. Apprenticeship is one of the original methods, based on a mentor-student relationship. It has largely fallen by the wayside because of the expense arising from the length of time required for the student to become fully trained.

Classroom education. The downfall of apprenticeship has led to the rise of classroom education as the accepted method of formal training. In two days or a week of in-depth learning, the student gains a solid base of knowledge to begin productively using a new skill.

But classroom education has its drawbacks, too. The courses typically are expensive, and additional costs of travel, accommodations and lost work time can add up to two to three times the cost of the course itself.

There is in-house classroom education, but this is only practical for the largest organizations, and it is still difficult for them to find and fully use in-

Continued on page 80

Report: Firms neglect security

BY DAVID A. LUDLUM
CW STAFF

Many companies are at risk from a lack of safeguards against computer abuse, which is generally not reported, causes major losses and may often go undetected, according to a report being prepared at the University of Minnesota.

Many computer users do not use safeguards that are built into their software and few use specialized security products, a working paper for the report states. Some managers believe security measures are ineffective, while others implement measures only after their systems are abused, the paper says.

However, data security administration is gradually being incorporated into American business and organizations, and security administrators generally are satisfied with the effectiveness of their efforts, the paper says.

The paper is the result of a study conducted by Detmar Straub, an assistant professor of MIS at the University of Minnesota, and Jeffrey Hoffer, a professor of MIS at Indiana University. Last year, under the auspices of the Data Processing Management Association, the two men conducted an anonymous survey of 5,489 managers on the deliberate, unauthorized misuse of information systems. The research was supported by Indiana University's Institute for Research on the Management of Information Systems and the Ball Corp. Foundation.

Along with examining security measures, the professors report on the frequency and types of computer abuse they found, the industries victimized and the occupations and motives of perpetrators, four out of five of whom were employees of the victimized organizations.

In responding to the survey, 211 organizations reported 259 incidents of abuse. The majority of the incidents were classified as "serious" or "extremely serious" for the cost or potential for damage; five cases reflected losses in excess of $100,000. The figures suggest about one-fifth of information systems organizations will experience computer abuse in a three-year period, the study states.

Of the abuses, 45% were detected through normal system controls, 32% by accident, 8% by computer security officers and 4.5% by auditors. The substantial portion detected by accident, along with other research, suggests that many incidents go undiscovered, the study says.

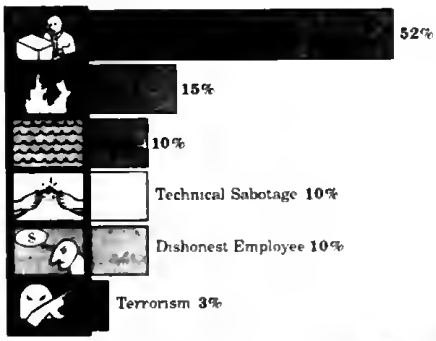
The study found 41% of the organizations had no ongoing security efforts. In some cases there were no security measures at all, not even passwords, a statistic the professors call alarmingly high. "No one is making any active attempt to prevent abuse," Straub says. "If they've got passwords, they're apparently being set up and no one is administering them. A good percentage have literally nothing

Continued on page 82

Data View

Loss leaders

Common causes of corporate information damage



INFORMATION PROVIDED BY DATAPRO RESEARCH CORP.
CW CHART: SUSAN ALLEN

Users eye possibilities of DEC AI configurer

BY NINAMARY BUBA MAGINNIS
CW STAFF

Digital Equipment Corp. may soon let customers utilize its much-touted Xsel program, an expert system for configuring VAXs that is used by the vendor's sales force and is being tested by OEMs.

In addition to configuring VAX systems, Xsel provides preliminary computer room floor plans and generates output that can be fed into DEC's automated quote system — capabilities that have spurred interest among OEMs and large DEC users such as General Motors Corp., according to Bruce MacDonald, who has been DEC's Xsel program director for more than five years.

A pilot program for OEMs is under way, but DEC is not yet making its Xsel available to MIS managers, said McDonald, who recently became DEC's marketing manager for the financial services industry, handing the reins for the Xsel project to Melissa Gallo.

In many cases, large users such as the Houston-based Shell Oil Co. work side by side with

Continued on page 78

MANAGEMENT MEMO

1706 no longer seen money-maker

BY DAVID A. LUDLUM
CW STAFF

Section 1706 of last year's tax reform act is not expected to raise additional tax revenues, according to James C. Miller III, director of the U.S. Office of Management and Budget.

The tax provision, which eliminates some tax breaks formerly enjoyed by independent computer professionals by denying them their independent status, was touted as worth an additional $60 million to the federal coffers during the next five years when it was passed by Congress.

However, a more recent study by the Department of the Treasury found the bill "at best will be revenue-neutral," Miller wrote in a letter to a former college classmate who is an independent computer consultant. A copy of this letter was provided to *Computerworld*.

Section 1706 was proposed to increase the Internal Revenue Service's enforcement capabilities and lower its costs of collecting taxes by establishing salary withholding for former independent contractors while eliminating their quarterly tax filings, Miller wrote in the letter.

He added that it will be quite difficult to get Section 1706 reconsidered, as called for in several pending congressional bills, for fear of "opening the floodgates" to changes from last year's tax reform "at a time when we are trying to close the current and projected excessively large deficits."

Six state legislatures are weighing 18 bills that bear on the health and comfort of computer terminal operators, according the Data Processing Management Association (DPMA).

The greatest concentration of activity is Massachusetts, where four House and two Senate bills are in committee. Other states weighing proposals are New York, where five are pending; California, Pennsylvania and Washington, with two proposals each, and Missouri with one.

Five of the Massachusetts bills involve safeguards for private-sector VDT operators, along with three in New York, a pair of companion bills in Washington, one in Pennsylvania and one in Missouri that would establish fines for violations.

Joseph E. Collins, the DPMA's governmental affairs manager, said he thinks that as in past years, bills calling for health and safety standards in private businesses will be turned down. "I don't think any bills that are going to place mandates on the private sector will pass. DPMA members have given testimony stressing changes they have made and the legislative leaders have seen that as progress," Collins said.

However, bills calling for workplace standards for government workers or for further study of the VDT health issue may be successful, Collins said.

Flextime scheduling is currently used by 30% of all businesses, double the 15% reported 10 years ago, according to a survey of 348 managers in various industries by the Administrative Management Society.

Insurers lead in flextime with 45% of surveyed companies reporting use, along with 41% of companies providing business, employment, travel and entertainment services.

Flextime plans usually offer a core time, when all employees must be at work, along with flexible starting and quitting times. Of the companies surveyed, 7% said they require that workers be at work by 11 a.m.

DEC configurer

CONTINUED FROM PAGE 75

DEC sales agents, mapping out potential configurations on the expert system, MacDonald said.

But placing Xsel directly in end users' hands is still under review as DEC investigates legal issues encompassing it, MacDonald noted.

DEC officials want to make sure the firm is protected should a customer receive erroneous or inadequate information from the expert system, MacDonald explained. In addition, DEC wants to prevent end users from using configuration and pricing information from Xsel as leverage with DEC's competition, MacDonald added.

IN ADDITION TO configuring VAX systems, Xsel provides preliminary computer room floor plans and generates output that can be fed into DEC's automated quote system.

MacDonald said only substantial DEC customers would find using Xsel worthwhile.

MIS managers from General Electric Co. and Electronic Data Systems Corp., for example, have hundreds of installed VAX computers and may want to reconfigure existing systems whether or not they place new orders, MacDonald said.

Acceptance of the Xsel program by OEMs points the way to a program for end users.

Currently, many OEMs depend on DEC sales representatives for configuration information, noted Jim Pompano, DEC senior consultant for the Connecticut district. OEMs usually work with several preconfigured VAXs but may want to explore the possibilities for enhancing them, Pompano said.

One DEC OEM and an early Xsel user is GE's nuclear energy operation in San Jose, Calif. The GE operation is required to receive DEC approval on VAX configurations before placing orders.

"Xsel is especially useful when we get to the last part of a proposal — when a customer would like to add one item or delete something. We can reconfigure very quickly," said Susan Schwee, GE's nuclear energy operations manager for computer product engineering.

Time saver

Without the expert system, the GE nuclear operation would spend up to four days configuring a VAX system. Now all the work can be accomplished in just one day, Schwee said.

Xsel was first implemented in 1984 as an adjunct to Xcon, an expert system that aids the VAX manufacturing process. Xcon went on-line in 1980, DEC's MacDonald said. Together, the two systems have saved the vendor a total of $25 million during a period of six years, MacDonald said.

DEC sales representatives claim a variety of benefits from using Xsel.

By using the expert configuration system, junior sales representatives have the ability to put together VAX systems as accurately as senior personnel, according to Pompano.

And even senior representatives need help, he added. "Even though they might not admit it, a senior sales rep would forget a cable or a mounting cabinet," Pompano explained. "But with Xsel, you don't have to worry about that because it will catch those oversights."

Seasoned sales representatives admit the problem.

"I was a darn good sales rep and knew my stuff, but DEC kept introducing new VAXs," recalled Sandy Mingia, DEC's western area artifical intelligence marketing manager. "Even with being a good sales rep and always making my numbers, I'll bet I made mistakes on 25% of the configurations."

Checking errors with another sales person would not prevent the problems, she noted.

"Because of the complexity — say 19 line items — there's lots of room to make little itty-bitty mistakes," Mingia said. "So getting an automated tool as a sanity check was a savior to me — to say nothing of customer satisfaction."

Productivity gains

Xsel also offers productivity gains, Mingia added. "Based on my knowledge and my experience as a DEC sales rep for four years, the configuration of a simple system could take 10 minutes and a complex one literally hours," she said.

In addition, Xsel can offer more choices in VAX installations, observed John Moorehead, the Shell Oil account manager for DEC's Houston sales office. "You can edit to a new configuration very easily and let customers choose one that fits their needs best," he explained.

Moorehead also cited Xsel's unused capacity reporting function. "If they want to add an additional component, Xsel can tell you if the existing power supply is adequate or if there is room in the cabinet for it," he said.

The expert system also can teach users by explaining errors, Moorehead added. "The next time you won't make that same mistake," he said.

It only takes a minute to prove we're four times faster than IBM.

Give the MegaLine™ Mod 5225 Ion Deposition Printer a minute and it'll give you 1,980 lines. That's four times more than IBM's 5225 can print.

In just one month, MegaLine can accelerate your printing volume to 150,000 pages. And if you think that figure looks impressive here.

Wait until you see what it does to your bottom line.

C. Itoh and IBM are made for each other. Just because C. Itoh is faster than IBM, doesn't mean we can't work together.

	IBM 5225	MegaLine Mod 5225
Lines/Min	280-560	2000
Characters/Line	136-198	136-198
Lines/Page	66-88	66-88
Twinax	Yes	Yes
Printer Type	Impact	Non Impact
Protocol	5225	5225

The fact is, our MegaLine printer is twinax compatible with IBM Systems/36-38.

And if you're concerned about character and line spacing compatibility, relax. MegaLine gives you 10 and 15 characters per inch (cpi), and 6 and 8 lines per inch (lpi). Just like IBM's 5225.

The low cost of high technology. For a high speed, high quality, high print resolution page printer, the MegaLine has remarkably low costs.

Its per copy cost is less than 2¢.

Its monthly maintenance costs are half what it takes to keep a laser printer going.

And its durable, four step ion deposition printing process — with few moving parts — means lower costs in the long run too.

Along with its high speed and low costs, our MegaLine has a smaller footprint than IBM's 5225. It's also much quieter.

Now what could be better than that?

Express yourself forty times faster than IBM's 5219. If you want all the features of our MegaLine *plus* electronic forms capability, you can't get any better than the new MegaPro™ Mod 5219 Ion Deposition Printer.

With its unique graphic arts features and proportionally spaced characters, the MegaPro lets you create attractive business forms at a quick 30 pages-per-minute (that's forty times faster than IBM's 5219).

It can manage up to 32 fonts on one page. Store up to six pages of forms at one time. And give you all the tools you need to express yourself — from line drawing and shading to bit-mapped graphics and logos.

All for just 2¢ a page.

8PT. 12 PT. 18 PT. 24 PT. 30 PT.
Many fonts are available in Regular, Bold and Italics, as well as multiple point sizes

At your service around-the-clock. No matter which printer you choose, you'll get C. Itoh's complete nationwide support. Including your choice of several on-site service plans that can provide assistance seven days a week, 24 hours a day.

So if you need a faster printer, don't wait another minute. Call C. Itoh toll-free 1-800-843-6143.

In California, call 1-800-323-2024. TELEX: 652-451. TWX: 910-343-7446. Or write us at 19300 So. Hamilton Ave., P.O. Box 9116, Torrance, CA 90508-9116.

C.ITOH
Image Systems Division

OK, SORBUS.

Tell me more.

Let me know just what Sorbus service can do for me.

Name _____

Title _____

Company _____

Street _____

City _____ State _____ Zip _____

I'm especially interested in service for the following hardware: _____

_____

Sorbus®
A Bell Atlantic Company

In a hurry? Call 1-800-FOR-INFO.

CW

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO 20 MALVERN, PA

POSTAGE WILL BE PAID BY ADDRESSEE

Sorbus®
A **Bell Atlantic**™ Company
50 E. Swedesford Road
Frazer, PA 19355-9976

One piece of computer equipment that Sorbus® doesn't service--yet.

Sorbus services more IBM® equipment than anybody else (except IBM). That includes the entire PC family, naturally. Plus Series I, System/34, System/36 and 36 PC, and System/38 minis. Not to mention 370, 4300, 303X, and 308X mainframes.

All the same, IBM is just the beginning.

We service more than 3,000 products, altogether. Including micros from 13 manufacturers, disk drives from 31, modems from 12, printers from 31, and so on, and so on. And we're the *only* authorized service company for MAI Basic Four® micros and minis.

For companies with mixed-vendor systems, our single-source convenience can mean the end of finger-pointing between service suppliers. And since we can't blame your trouble on anybody else, all we can do is fix it.

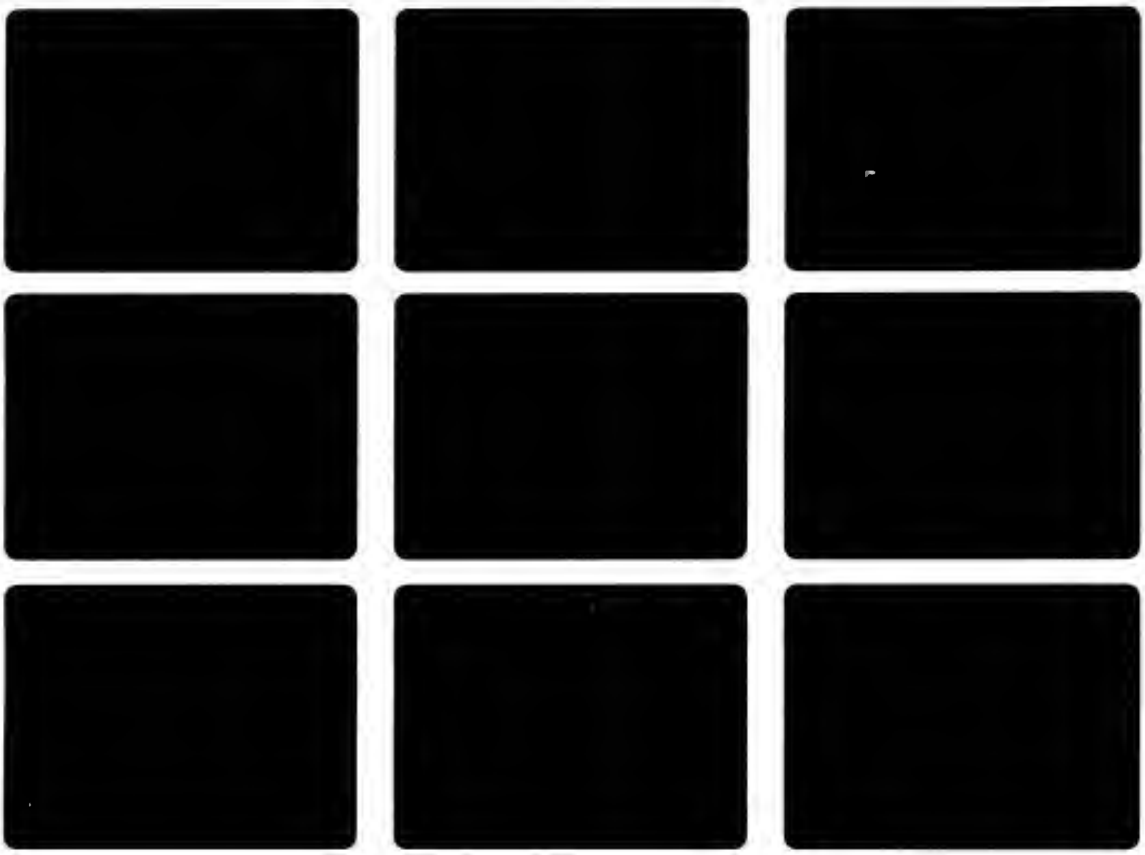
Fast. We're usually on-site within two hours, and we're usually done within another hour and a half.

For one-call convenience tomorrow, there's one call you should make today. Call Sorbus. **1-800-FOR-INFO.**

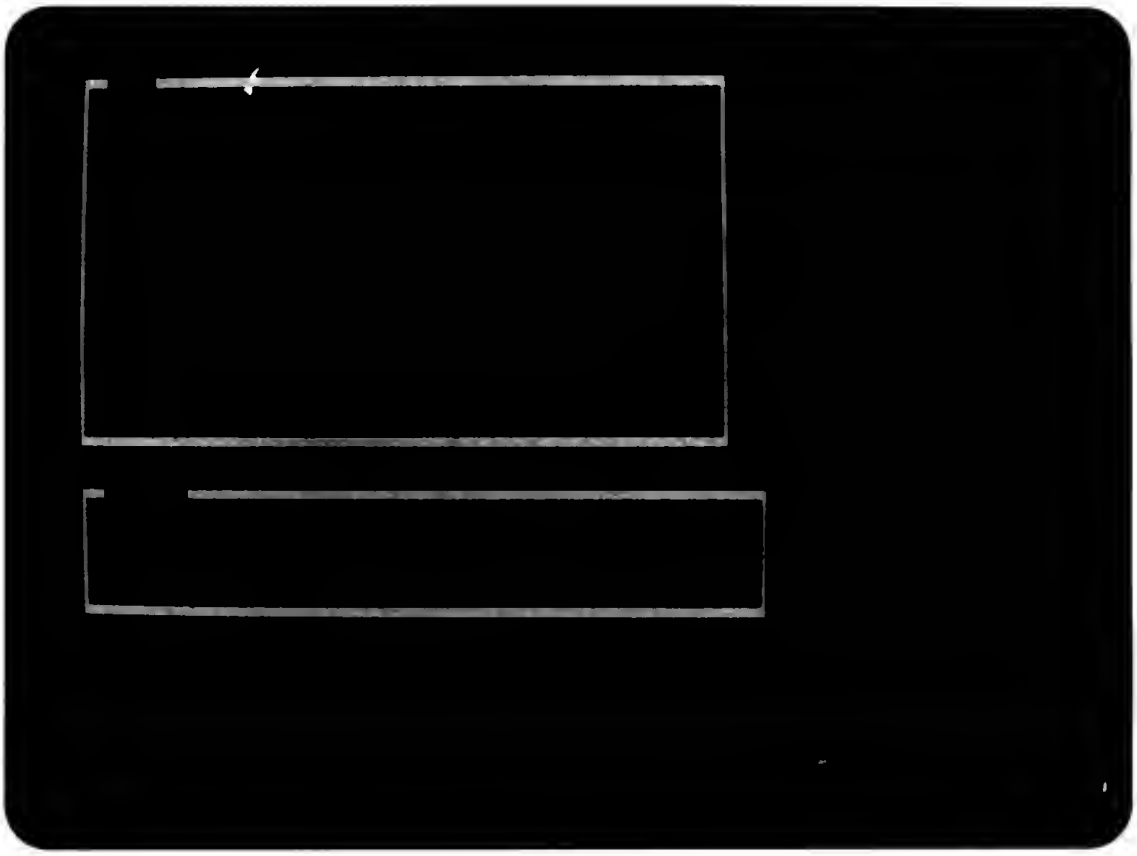
Sorbus®
A Bell Atlantic™ Company

50 E. Swedesford Road
Frazer, PA 19355

IBM is a registered trademark of International Business Machines, Inc. Sorbus is a registered trademark of Sorbus Inc.



NOMAD HAS ALWAYS GIVEN YOU MORE FROM YOUR MAINFRAME.



NOW WE GIVE IT TO YOU IN ONE FRAME.

Database listings, reports, command histories. It was always possible to see these things with NOMAD—just not all at one time.

It used to be that once you looked at a screen, it was gone forever. If you wanted to refer back to the information, you had to scribble it down or re-execute the commands. But now NOMAD lets you keep that information visible for as long as you want. Because NOMAD is the first 4GL/DBMS to offer you the productivity and efficiency of interactive windows on a mainframe.

Windows make it easier to access the power of the mainframe, because they are already familiar to many people who use PCs. And NOMAD allows applications developers to create windows that look the same whether they appear on a mainframe or a PC. So your users can switch easily between the two, without extra training.

In addition to NOMAD's own databases, you can use windows to look at a variety of other databases, such as SQL/DS or DB2, as well as IMS, IDMS and several other file formats. Once you see all of your information displayed in a single screen, the word mainframe will take on a new meaning.

If you would like more information, please write to Deborah Cox, at D&B Computing Services, 187 Danbury Road, Wilton, CT 06897. Or call her at (203) 762-2511. In the U.K. or Europe, direct your calls to Pierre Jouanny in Paris: 33(1)42852552.

D & B Computing Services has offices throughout the U.S. and in London, Paris, Munich, Rome, Turin, Cologne, Brussels and Amsterdam.

NOMAD
NO TASK IS IMPOSSIBLE.

D&B Computing Services
a company of The Dun & Bradstreet Corporation

NOMAD is a registered trademark of D & B Computing Services, Inc.

CBT courses

FROM PAGE 75

structors with the depth of expertise required in each subject area. Another problem is the cost of developing in-house courses.

Computer-based training. Yes, there is a better way, but if I say it is computer-based training (CBT), you probably will say that you heard that same story 10 or more years ago. I know. In 1976, I worked for a postsecondary educational institution that pioneered computer-aided instruction (CAI). I supported the software that provided the design and delivery mechanisms for major segments of courses in several disciplines.

Topics were selected that either did not require large textual explanations or were explained by the instructor just prior to the drill and practice provided by CAI. But self-study, programmed learning and CAI all have failed to replace classroom education because they boil down to learning from a book, which normally means a lot of reading.

After all these years, however, CBT is starting to deliver what it promised for so long: an effective alternative to classroom education. A careful look at some of the state-of-the-art CBT just coming to market will demonstrate that the missing ingredient has finally been found — namely, that the courses be interesting if not downright entertaining.

This has been accomplished in several ways, the most important of which is the effective use of graphics. The saying "a picture is worth a thousand words" is nowhere more true than in CBT. Diagrams and other pictorial representations are available in books. But with CBT, it is possible to provide animated pictures — diagrams that move to show what is going on inside a software package.

What made the use of animation possible? The graphics capability of the IBM Personal Computer. Although the standard IBM PC is primitive by modern graphics standards, the typical IBM 3270 terminal has no graphics capabilities whatsoever. Admittedly, using the IBM PC is not a new idea in CBT. To ensure compatibility between PC and mainframe versions, no graphics were used.

Stretching dollars

An additional incentive for developing courses specifically for the IBM PC has been the realization that using the mainframe for delivering education is very expensive.

The full capabilities of the PC are now being exploited to produce very impressive and very interesting training. Techniques never dreamed of on the mainframe can now easily be done in the single-user environment of the PC.

Another important technique that is just starting to be used effectively is the simulation of the operation of the software the student is learning about. By CBT providing a controlled environment, the student can get used to the software and get a lot of assistance in using it the first time.

The type of simulation employed varies. When the topic is software with a distinctive screen format and method of operation, the screen can be displayed just as the student would see it when operating the real package. The keys function normally, but the student is restricted to the functions necessary to complete the assigned task. Any other operations offer helpful correction and advice.

When the topic is software requiring free-format input from the student, the student can be led to write the key parts of the statements. This is usually done in a fill-in-the-blank approach whereby the content of each blank is checked as it is filled in.

In summary, state-of-the-art CBT designed specifically for use on the IBM PC has become a cost-effective teaching tool through the use of interesting graphics and simulation of the subject matter being taught. It has finally come of age.

Pearkins is a technical support consultant with Software Specialists, Ltd. in Edmonton, Alberta, Canada.

"When I Replaced My IBM Main Storage With EMC Main Storage, My 4381's Performance Improved 30 Percent."

—Ralph Reynolds
Universal Instruments Corp.

"We have the equivalent of 340 data entry terminals running CBDS graphics applications at subsecond response on a 4381 P1 computer. When I replaced my IBM main storage with an equal amount of EMC main storage performance on the CBDS application rose 30 percent."

What Ralph Reynolds found is what 4381 users running all types of applications have found **4381 computers using EMC main storage upgrades out-perform systems with equal capacities of IBM main storage.**
The reason? EMC's main storage upgrades utilize faster RAM devices for **100 percent faster** write times. It takes IBM upgrades 22 processor cycles for every write. EMC upgrades perform the same write in only 11 cycles. By performing writes faster EMC upgrades free up processor time for other functions, allowing your 4381 computer and your users to do more work in less time.

IBM is a registered trademark of International Business Machines.
CBDS is a trademark of Bell Northern.
Copyright 1987 EMC Corporation.

But as users like Ralph Reynolds have discovered, EMC offers more than improved performance, including:

- Cost savings of $20,000 on every 8 megabyte upgrade.
- Proven reliability—a result of our 100-hour burn-in and CPU test procedure.
- Dependable service, starting with our lifetime warranty and including a choice of on-site service programs.

EMC Corporation. The System Enhancement Company.
As a system enhancement company, EMC specializes in designing cost-effective products which help users overcome performance bottlenecks and improve the productivity of their existing systems. Today EMC products are in use at over 10,000 IBM, Digital, Hewlett-Packard, Prime and Wang computer sites.

If You Want Maximum Performance From Your 4381 Computer, Call Today.
For more information about EMC's high-speed main storage upgrades for your 4381 computer call EMC today at 1-800-222-EMC2 (In Mass. call 617-655-6600). We'll put you in touch with the EMC Sales and Service office nearest you.

Call Today
1-800-222-EMC2

In Mass. Hopkinton 617-435-2541
In Toronto 416-368-4726
In Vancouver 604-662-3911
In England 01-668 5511
In West Germany (0619648) 1885

EMC²

Introducing the most reliable DEC™-compatible terminal ever built. The TeleVideo 9220.

"Why do we want thousands of TeleVideo® terminals? Because we can't afford thousands of problems."

Susan Kennedy should know. She's a product analyst at Leasametric, a company that rents, sells, and services DP equipment all over the country. Including thousands of terminals. And since reliability is crucial to Leasametric, they tear each evaluation unit apart piece by piece. Then, they give it a series of tests that make MIT exams look easy.

"Too many terminals just don't measure up," says Susan. "I've seen machines with questionable ergonomics...keyboards that flex in the middle when you type... even cheap little diodes that could drop off.

"But TeleVideo starts with solid engineering, and follows through with every detail. Overall, they've built the same quality into the 9220 that's made all their other terminals last so long."

And there's more to the 9220 than quality and reliability. There's also an extended feature set, including full VT-220 compatibility. A super-dark 14" amber screen. A tilt and swivel base. 30 programmable function keys. Plus the best thought-out ergonomics around. All for exactly $619.

The TeleVideo 9220. For more information, or the name of your nearest distributor, call 800-835-3228.

TeleVideo®
Settle for more.

TeleVideo Systems, Inc., 1170 Morse Avenue, P.O. Box 3568, Sunnyvale, CA 94088-3568 (408) 745-7760
Regional Offices: West (408) 745-7760, Southwest (714) 476-0244, South Central (214) 550-1060, Southeast (404) 447-1231, Midwest (312) 397-5400, East (516) 496-4777, Northeast (617) 890-3282. Amsterdam: 31.2503.35444, Paris 33 1 4687 34 40, London 44 9905 6464

DEC and VT-220 are trademarks of Digital Equipment Corporation

©1986 TeleVideo Systems, Inc.

Security

CONTINUED FROM PAGE 75

The organizations with no ongoing security measures, some of which may operate in a batch mode, include larger organizations, Straub says.

Straub says the organizations may lack security because managers trust their employees or because there is a lack of support from top management. "We're talking about major commitment here whenever we implement security."

The industry groups in which organizations were most often without safeguards were medical and legal services (62%), construction (55%), wholesale and retail trade (53%), transportation (52%), petroleum (50%) and manufacturing (47%).

Of the organizations that reported incidents of abuse, about one-fifth initiated security measures after an abuse occurred, and most of them did so shortly after discovery of an incident.

However, the study found organizations are adding computer security units at a rate of about 9% a year, a figure it says has been fairly constant since 1983. This figure is up from about 4% between 1980 and 1983 and from about 2% during most of the 1970s.

Of the organizations surveyed, those with one to 10 employees devoted an average of nine man-hours a week to computer security; those with 11 to 49 employees assigned an average of 20 man-hours a week; and those with larger staffs provided 94 man-hours a week.

Of these efforts, 51% were directed toward data security, 32% toward physical security and disaster recovery, 11% toward user training and 6% toward other tasks.

Of the organizations with some security staff, 32% said they used devices to control access to data bases, 18% of them from within fourth-generation languages. Of the group, 23% used specialized software systems; of those, 61% reported using only programs purchased from vendors, 13% used programs developed in-house and 26% used both.

Of those incidents that were discovered, fewer than 10% were reported to law enforcement authorities. In interviews conducted in conjunction with the survey, respondents said they did not report the incidents because they feared they would reveal the inadequacy of their security.

Other research shows reporting abuses and the prosecution of perpetrators can discourage further incidents, Straub and Hoffer say. The lack of reporting is particularly discouraging given the attention lavished on computer abuse by the media, they say.

The study also found about half the managers (50.8%) are not convinced deterrence measures such as guidelines and education will stop employees from attempting to abuse systems, contrary to other research by Straub, although they may believe physical and software controls prevent attempts from succeeding.

The most common type of abuse reported in the survey was unauthorized use of computer service, followed by theft or abuse of data, disruption of computer service, alteration of programs and theft or other abuse of hardware

The study found a greater likelihood of abuse among certain industry groups, particularly education, wholesale and retail trade and utilities.

Despite having larger security staffs, larger organizations reported being victims more frequently than smaller organizations.

Of the perpetrators, 81% were employees and 6% were former employees. The study found that an employee's level of system privileges is not associated with the likelihood of abuse. Those most frequently involved employees were application programmers (18%), clerical personnel (14%), other users (14%), students (12%), managers (11%) and systems analysts (6%).

The most common motives of the perpetrators were personal gain (30%), ignorance of proper conduct (26%), misguided playfulness (24%) and maliciousness (10%).

CALENDAR

MAY 31-JUNE 6

Banklink 1987 Users Conference. Nashville, May 31-June 3 — Contact: Banklink, Inc., 12th Floor, 380 Madison Ave., New York, N.Y. 10017.

ABA National Operations and Automation Conference. San Francisco, May 31-June 3 — Contact: American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

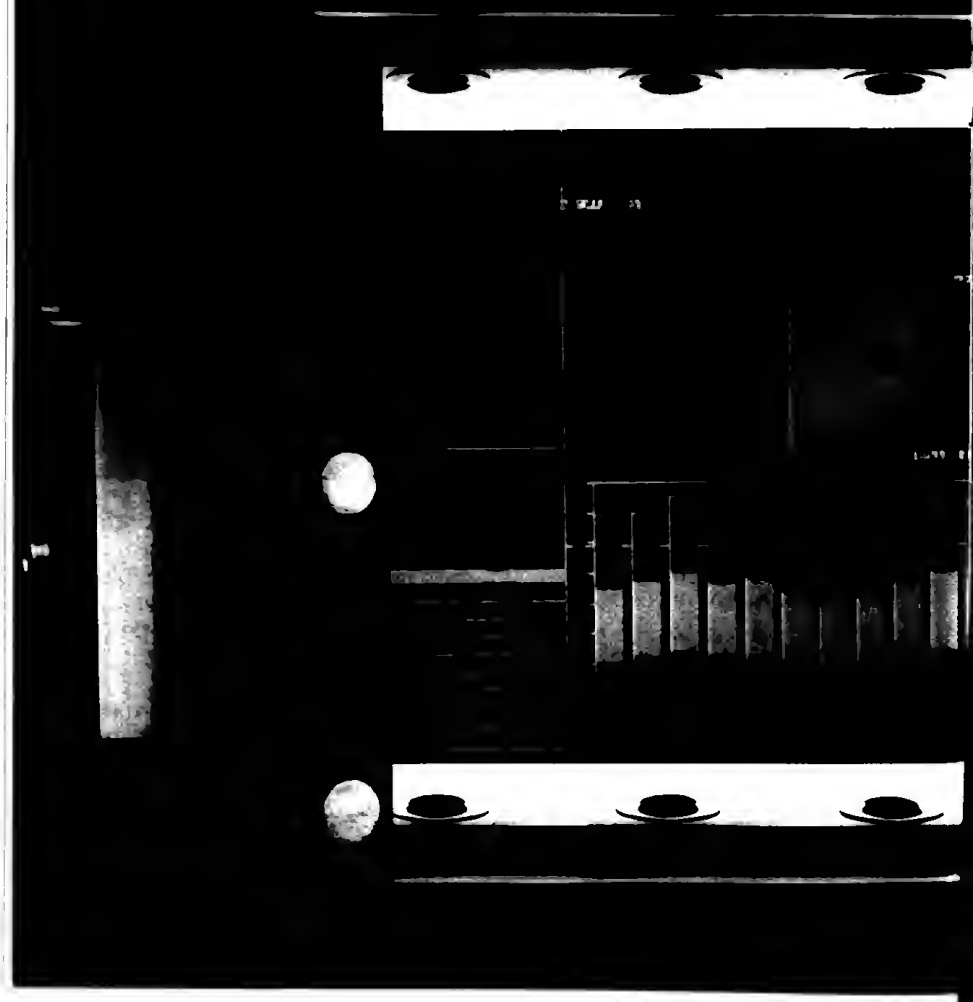
ISDN '87: Symposium on Integrated Services in Digital Networks for Telecommunications. Monterey, Calif., May 31-June 4 — Contact: Russ deWitt, Contel Service Corp., 245 Perimeter Center Pkwy., Atlanta, Ga. 30346.

Fuse '87, The National Focus Users Meeting. Palm Desert, Calif., May 31-June 5 — Contact: Fuse, Inc., Suite 4302, 450 7th Ave., New York, N.Y. 10123.

Computer Law Update. June 1-2 — Contact: Barbara Fieser, Suite 210, 8303 Arlington Blvd., Fairfax, Va. 22031.

AICPA 1987 Microcomputer Conference & Exhibition. Dallas, June 1-3

AT&T Power Protection Systems:
Your best security against
costly downtime.



— Contact: Continuing Professional Education Division, American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, N.Y. 10036.

Seventh Annual Conference of the Association of Human Resource Systems Professionals. Minneapolis, June 1-3 — Contact: Susan G. Goldenberg, HRSP, Inc., P.O. Box 8040-A202, Walnut Creek, Calif. 94596.

Take the Lead in Data Capture. Los Angeles, June 1-3 — Contact: Data Entry Management Association, P.O. Box 16711, Stamford, Conn. 06905.

Second Guelph Symposium on Computer Conferencing. Guelph, Ont. June 1-4 — Contact: Division of Continuing Education, Room 160, Johnston Hall, University of Guelph, Guelph, Ont., Canada N1G 2W1.

Comdex/Spring '87. Atlanta, June 1-4 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

EFOC/LAN 87 — The 5th European Fibre Optic Communications and Local Area Networks Conference, Educational Program and Exhibition. Basel, Switzerland, June 1-5 — Contact: IGI Europe, Inc., Suite 200, 214 Harvard Ave., Boston, Mass. 02134.

Distributed Processing: Leveraging Architectures, Applications and the Organization. New York, June 2-3 — Contact: William Smulsky, Seminar Division, The Yankee Group, 200 Portland St., Boston, Mass. 02114. Also being held June 9-10 in San Francisco.

NTT International Symposium 87. Tokyo, June 2-3 — Contact: Nippon Telegraph and Telephone Corp.'s International Symposium 87, c/o International Public Relations Co., Shinbashi Fuji Bldg., 2-1-3 Shinbashi, Minato-ku, Tokyo 105, Japan.

10th Annual Contemporary Copyright and Proprietary Rights Issues Institute. Washington, D.C., June 3-4 — Contact: Stephen Glasser, Prentice-Hall Law & Business, 855 Valley Road, Clifton, N.J. 07013.

AI/Europa '87. Frankfurt, West Germany, June 3-5 — Contact: TCM Expositions, Ltd., 331 W. Wesley St., Wheaton, Ill. 60187.

JUNE 7-13

Adpac Corp.'s Annual Users Group Conference. Atlantic City, June 7-9 — Contact: Adpac Corp., Users Group Conference, P.O. Box 3337, San Francisco, Calif. 94119.

Annual Disc, Inc. Users Conference. New Orleans, June 7-10 — Contact: Gerald J. Markowitz, Disc, Inc., 1314 Bedford Ave., Baltimore, Md. 21208.

Insurance Accounting & Systems Association's 65th Annual Conference. Chicago, June 7-10 — Contact: Elaine Powell, IASA International Office, P.O. Box 8857, Durham, N.C. 27707.

Bar Coding Seminar Series. Atlanta, June 8-9 — Contact: Automatic Identification Manufacturers, Inc., 1326 Freeport Road, Pittsburgh, Pa. 15238.

1987 Federation of Conferences on Information Systems. Washington, D.C., June 8-10 — Contact: National Council for Education on Information Strategies, P.O. Box N, Wayland, Mass. 01778.

Seventh International Conference on Decision Support Systems. San Francisco, June 8-11 — Contact: Julie Eldridge, DSS-87, The Institute of Management Sciences, 290 Westminster St., Providence, R.I. 02903.

Sixteenth Annual Meeting of the MUMPS Users' Group. Atlanta, June 8-12 — Contact: MUG, Suite 510, 4321 Hartwick Road, College Park, Md. 20740.

ACM Tutorials for Professional Development. New York, June 8-12 — Contact: Bridget Gann, Association for Computing Machinery, 11 W. 42nd St., New York, N.Y. 10036.

Usenix Association's Annual Summer Conference and Vendor Exhibition. Phoenix, June 8-12 — Contact: Usenix Conference Office, P.O. Box 385, Sunset Beach, Calif. 90742.

Workshops on Computer-Assisted Map Analysis. Tucson, Ariz., June 9-10 — Contact: Joseph K. Berry, School of Forestry and Environmental Studies, Yale University, 205 Prospect St., New Haven, Conn. 06511. Also being held June 17-18 in Athens, Ga., Sept. 16-17 in Corvallis, Ore., and Oct. 24-25 in Berkeley, Calif.

ICI 1987 Annual Conference. Dallas, June 9-12 — Contact: Information Center Institute, 3772 Realty Road, Dallas, Texas 75244.

European Corporate Electronic Publishing Exhibit & Conference. Frankfurt, West Germany, June 10-12 — Contact: Paula Wertman, Interconsult Inc., 48 Brattle St., Cambridge, Mass. 02138.

Continued on page 84

Eliminate the cause of up to 50% of your computer downtime: power disturbances.

Power-disturbances, brief and imperceptible, cause very visible data loss, data errors, and equipment damage, all resulting in costly downtime.

According to AT&T Bell Laboratories and IBM research, a typical computer site experiences as many as 135 commercial power disturbances a year, accounting for up to 50% of all computer downtime.

The protection solution. AT&T offers two product lines to combat these disturbances: the Uninterruptible Power System (UPS) and the Power Line Conditioner (PLC). Each effectively eliminates power fluctuations, including noise, transients, peaks, brownouts, and distortions. The difference being that the UPS includes a built-in battery reserve for protection against blackouts. The UPS is available in 1, 3, 5 and 10 KVA power ranges. The PLC is available in 3, 5 and 10 KVA models.

A 50-year advantage. Why specify AT&T's power protection equipment over that of other manufacturers? Because AT&T has an unmatched 50 years of experience in manufacturing power equipment. And, because AT&T also designs and manufactures computers, we have a unique understanding of what should go into a superior power protection product.

For instance, our parallel processing architecture offers reliability few others can provide. It also maximizes cost-efficiency: less power is needed to run our systems, and heat loss is substantially reduced.

Easy does it. AT&T UPS and PLC power protection systems are easy to install, need no operator, and require no scheduled maintenance.

Furthermore, AT&T backs you with an unequalled nationwide service network and a 24-hour toll-free number for technical service support.

Fast delivery. AT&T is ready to ship from stock. Once our Dallas facility has your order in-hand, we'll have your system speeding on its way to your site.

So for maximum security against power disturbances, along with low-cost, trouble-free performance, call AT&T at **1 800 372-2447** or mail the coupon below. Let us show you how to turn expensive downtime into productive uptime.

© 1987 AT&T

AT&T's UPS is available in 1, 3, 5 and 10 KVA models.

CW 5/25/87

AT&T Power Protection Systems
Dept. 20130-LEADS, 555 Union Blvd., Allentown, PA 18104
Please send me more information on UPS and PLC.

Name _____
Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Phone ( ) _____

AT&T
The right choice.

Continued from page 83

Topic V: The Fifth Annual Security Conference for Top Secret Users). Denver, June 10-12 — Contact: Computer Associates International, Inc., 711 Stewart Ave., Garden City, N.Y. 11530.

Next Generation Information Systems: Technology for the Future. Gaithersburg, Md., June 11 — Contact: Wilma M. Osborne, B266 Technology Bldg. National Bureau of Standards, Gaithersburg, Md. 20899.

C'87: Computer — Software — Electronics. Cologne, West Germany, June 11-14 — Contact: Koln Messe, Messe- und Ausstellungs-GmbH Koln, Messeplatz 1, Postfach 21 07 60, D-5000 Koln 21, Deutz.

JUNE 14-20

Spectrum Conference on the Information and Telecommunications Systems Industry. Hyannis, Mass., June 14-16 — Contact: Jean A. Carbone, Decision Resources, Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140.

Harris Users' Exchange 1987 Symposium and Annual Meeting. Chicago, June 14-17 — Contact: Harris Users' Exchange, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

1987 Government Management Information Sciences Conference. Minneapolis, June 14-18 — Contact: Stanley F. Gabriel, Management Information Services, Room A025, Mail Code 008, Government Center, Minneapolis, Minn. 55487.

1987 IFPS Users' Association National Meeting. Washington, D.C., June 14-18. Contact: Merrill Medansky, Premark International, Room 452, 2211 Sanders Road, Northbrook, Ill. 60062.

Managing the Information Resource: Building Strategic Advantage. Lexington, Mass., June 14-19 — Contact: Annette Christensen, Suite 2381, Office of Executive Education, University of California at Los Angeles Graduate School of Management, Los Angeles, Calif. 90024.

EDP Auditors Association, Inc. 15th Annual Conference. Seattle, June 14-19 — Contact: EDPAA, P.O. Box 88180, Carol Stream, Ill. 60188.

Windows/Pagemaker Desktop Publishing Forum. New York, June 15-16 — Contact: Betsy Nagle, Hara & Associates, Suite 301, 2 Nickerson St., Seattle, Wash. 98109. Also being held June 23-24 in Los Angeles.

1987 Logic, Inc. Users' Conference. Irving, Texas, June 15-16 — Contact: Jonathan Bernstein or Susan Newberry, Grody/Tellem Communications, Inc., Suite 840, 11150 W. Olympic Blvd., Los Angeles, Calif. 90064.

Localnet East Exhibition and Conference. New York, June 15-17 — Contact: Carol Peters, Online International, Inc., 989 Avenue of the Americas, New York, N.Y. 10018.

1987 National Computer Conference. Chicago, June 15-18 — Contact: NCC '87, American Federation of Information Processing Societies, 1899 Preston White Drive, Reston, Va. 22091.

Network 90's. San Francisco, June 15-18 — Contact: U.S. Telecommunications Suppliers Association, Suite 600, 150 N. Michigan Ave., Chicago, Ill. 60601.

ISDN/87: The Third International Integrated Services Digital Networks Exposition. Atlanta, June 15-19 — Contact: Christopher Kennelly, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

Comdex International in Europe. Nice, France, June 16-18 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Office Products Exchange Network, Inc. (IBM office systems users group) Conference. Stamford, Conn., June 16-18 — Contact: Coral Aiken, Stone and Webster Engineering Corp., 7th Floor, 245 Summer St., Boston, Mass. 02107.

Flat Panel Displays 1987 International Conference. Copenhagen, Denmark, June 17-18 — Contact: International Planning Information, Nordre Ringvej 201, 2600 Glostrup, Copenhagen, Denmark.

Justifying Automation: A Survival Strategy for the Coming Decade. Detroit, Mich., June 17-18 — Contact: Steve Trombino, Robotic Industries Association, 900 Victors Way, P.O. Box 3724, Ann Arbor, Mich. 48106.

JUNE 21-27

Integrating Publishing Systems. Newton, Mass., June 23-24 — Contact: Bruc Schatzman, Xerox Systems Institute, Xerox Corp., 475 Oakmead Pkwy., Sunnyvale, Calif. 94086.

KBS 87: The Knowledge Based and Expert Systems Show. London, June 23-25 — Contact: Online International, Pinner Green House, Ash Hill Drive, Pinner, Middx HA5 2AE, U.K.

BREAK THE BARRIERS

...TO EASY, ACCURATE DATA ENTRY. The biggest hurdle to getting what you want out of dBASE™ and 1-2-3™ is getting the right data in. That's why you need the ease and accuracy of SPSS Data Entry II™. This isn't a database or a spreadsheet. It's a totally NEW data entry, editing and cleaning tool.

Read It. Popular PC, mainframe and mini files are open to SPSS Data Entry II. It reads, checks, cleans and writes any ASCII, dBASE II™ or III™, Symphony™ or 1-2-3™, Multiplan™, SPSS-X™ or SPSS/PC+™ file. And lets you translate any of these formats to another!

Screen It. Through a series of simple menus, SPSS Data Entry II lets you custom design each input screen—even create spreadsheet entry forms.

Clean It. A built-in data checker instantly catches errors as they're read or keyed in, assuring you of a cleaner, more accurate output. You tailor the cleaning rules to your needs. Data Entry II guards your data, whether you import it, key it in or want to check it before sending it to another program.

Believe It. SPSS Data Entry II is fully supported by SPSS Inc., a leader in software for over 20 years. If you'd like to learn about this data entry breakthrough,

CALL 1/312/329-3320

SPSS inc. SPSS Inc. • 444 North Michigan Avenue, Suite 3000 • Chicago, Illinois 60611
In Europe SPSS Europe B.V. • PO Box 115 • 4200 AC Gorinchem, The Netherlands • Telephone: +31183036711 • TWX 21019

SPSS Data Entry II runs on IBM PC, XT, AT or compatible microcomputers with a Hardcard™ or hard disk. dBASE II and III are trademarks of Ashton-Tate. Symphony and 1-2-3 are trademarks of Lotus Development Corporation. Multiplan is a trademark of Microsoft. SPSS Data Entry II, SPSS-X and SPSS/PC+ are trademarks of SPSS Inc. © 1987 SPSS Inc.

Only Two DBMS/4GLs Are Good Enough to be Called CompuServe:

System 1022
System 1032

CompuServe is one of the largest information sources in the country. So when we went shopping for a DBMS/4GL company, we knew exactly what we wanted.

We acquired the entire System 1022 and System 1032 business from Software House of Cambridge, Massachusetts. And our new division can do what CompuServe has never done before: license system software products to you for unlimited use on your DECsystem or VAX.

System 1022 is the premier DBMS for the DEC-10s and DEC-20s. For years it's been the backbone of our own on-line information systems. We're investing now to make this product even more productive for its hardware environment, with total PC integration, integration with VAX, and facilities to extend the lifespan of your TOPS-10/20 applications.

System 1032 is one of the most powerful 4GLs for applications development on the VAX. If you need screen-based applications development, you should see what we've been doing. And take a look at the PC integration/PC workstation ideas CompuServe is adding.

CompuServe offers you a whole new way of looking at your data and applications needs. We can supply all the pieces: the mainframe software, the distributed network, and even the data itself — all from a single source.

Call us to talk about your applications at (617) 661-9440.

CompuServe

Data Technologies

formerly Software House
1000 Massachusetts Avenue
Cambridge, MA 02138
Tel (617) 661-9440

EVERYBODY ON THIS LIST GETS COMPUTERWORLD TOO LATE.

If you're on the office route slip, you're getting COMPUTERWORLD too late.

You need to know the most up-to-date news in the computer field as it happens. Hot off the presses. While you can still use it.

COMPUTERWORLD keeps you on top of all the latest news, products, people, developments, trends, ideas and issues. Plus, we've expanded our coverage of microcomputing and networking, and we've added SPOTLIGHT — a handy pull-out section that can be saved for future reference.

Each SPOTLIGHT features a particular product category with surveys of key vendors and tables outlining prices, vendors and specifications. Plus, with DAIL-INQ you can request information about products in SPOTLIGHT with just one phone call!

So get off the route slip and get your own copy of COMPUTERWORLD for just 76¢ a week! That's $38.95 for 51 weekly issues of COMPUTERWORLD, plus 12 issues of Computerworld Focus — FREE. Each FOCUS issue provides in-depth coverage of a current hot topic such as information centers, PCs, software, and more.

Subscribe today! Call toll-free **1-800-544-3712** (in PA, call collect 215-768-0388) or use the convenient postage-paid order cards in this issue.

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY.

COMPUTER INDUSTRY

INDUSTRY INSIGHT

Alan Alper

A sun rises in the West

Wander the streets of almost any Manhattan neighborhood, and you're bound to pass a fruit and vegetable stand owned by Koreans.

The Koreans are a hard-working, disciplined people, according to those who regard stereotypes as meaningful. They're willing to put in long hours — in some cases, 'round the clock — to succeed. Many came to this country with little to speak of, but today dominate a commodity business that, until a few years ago, was controlled by Italian and Irish immigrants.

This has occurred during boom times in their native land: South Korea, which, without question, is the Third World economic success story of the decade.

The country's industrial complex has carved out substantial positions in commodity businesses such as semiconductors, consumer electronics and automobiles. South Korea's gross national product grew almost 16% in the first quarter from a year earlier, a good portion of which was derived from computer and electronics products.

Prosperity amid dissent

Ironically, prosperity has come amid massive political dissent, which threatens to throw the country into turmoil.

Still, South Korea's major industrial concerns are beginning to flex their low-cost, vertically integrated manufacturing muscle in another commodity business — microcomputers. After a few years of testing the personal computer waters as contract manufacturers for U.S. vendors, the Koreans seem ready to claim a broader piece of the market.

The Koreans perceive a void in the U.S. PC market as IBM all but abandons the low end of the business. Like other PC makers, the Koreans realize it will be at least another year until the Personal System/2 becomes an ac-

Continued on page 92

Dove to patch leaky MCC boat

Halting withdrawals from research venture, push for 5GL top agenda

BY ALAN J. RYAN
CW STAFF

AUSTIN, Texas — When Grant Dove tackles the task of running the Microelectronics and Computer Technology Corp. (MCC) in July, one of his first tasks will be to try to convince three shareholders that are planning to withdraw from the group to reconsider their decisions.

Dove, 58, a 28-year veteran of Texas Instruments, Inc., says he will try to reverse the decision of the three companies — Allied-Signal, Inc., Unisys Corp. and Lockheed Missiles & Space Co. — that have said they will sell their shares and will not participate further in the activities of the 20-member cooperative research venture.

A fourth company, General Electric Co., has said it will continue as a shareholder but has not yet decided whether it will continue its MCC participation. An MCC spokesman says GE is considering shifting its participation to another program within MCC.

'Listening mode'

Another priority for the new chairman and chief executive officer will be to hold meetings with top-level executives and research and development managers of current shareholders. Dove says he will solicit from them their views on the concept of MCC and will ask how well the consortium is meeting their needs. "I'll be in a listening mode," he adds.

The enthusiastic Virginia native, who calls himself an internationalist because he travels so frequently, is also ready to sell other companies on the idea of MCC.

Prospects Dove plans to concentrate on include the semiconductor, data processing and defense large-systems design fields and companies that make specialized workstations. "In general, we serve the entire microelectronics and computer industry, and I think we have something that would be of interest to most of those companies," he says.

"There are many . . companies that will need high-technology fifth-generation foundation programs for their future products," Dove adds. MCC started with seven discrete programs after being chartered in 1982.

Four of those programs were later combined to form what is now the advanced computer ar-

Continued on page 94

AMD asks for $1B in Intel suit

BY ALAN J. RYAN
CW STAFF

SANTA CLARA, Calif. — Advanced Micro Devices, Inc (AMD), claiming that Intel Corp. has not lived up to its end of a 10-year technology exchange agreement, has reportedly asked a court-appointed arbitrator for either $1 billion in damages from Intel or a transfer of technology and $100 million.

According to industry sources, AMD has claimed its agreement with Intel covered any Intel multiple processor units developed during the life of the agreement. Once the deal is terminated, one analyst said, AMD would be entitled to any technology exchanged during the contract period. But Intel reportedly has said it never agreed to share 386 technology.

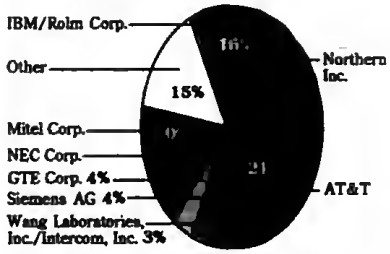
One industry analyst said AMD could stand to lose a great deal if the dispute is settled in favor of Intel and that most of AMD's revenue is generated through its second-sourcing of product lines.

Neither company would comment directly on the issue, saying that they have agreed not to discuss the matter in public

Data View

U.S. private branch exchange market, 1986

The five largest firms controlled 76% of the $3.73 million market



INFORMATION PROVIDED BY SALOMON BROTHERS, INC
CW CHART

HP earnings on target

BY ALAN J. RYAN
CW STAFF

Analysts said last week that earnings for Hewlett-Packard Co.'s second quarter were in line with expectations, while Ashton-Tate's first-quarter earnings were a bit soft but not alarming.

In Palo Alto, Calif., HP reported a 13% hike in sales and a 28% increase in earnings for the period ended April 30.

Orders in the quarter were up 20% from the same period for

Continued on page 91

Inside

- Iomega class-action suit settlement gets preliminary OK. Page 90.
- Chip honchos outline Sematech plans. Page 91.

PC-geared net tools lead Sytek diversification

BY PATRICIA KEEFE
CW STAFF

MOUNTAIN VIEW, Calif. — In an effort to diversify its revenue base and shore up a sagging profit line, Sytek, Inc. is readying a family of personal computer-oriented networking products for introduction this summer, a spokesman said recently.

"Our goal is to attach [islands of] subnets, which use different protocols and media, into the larger overall corporate network," Sytek spokesman Stuart McFaul said. Sytek will offer bridges and gateways as the means by which these networks are linked, he added.

The PC market represents a significant departure for Sytek, which has traditionally focused on much larger networks tied into larger systems. "There is definitely a move toward providing smaller networks," McFaul said.

Loss drove change

Fueling this change in strategy was a major loss recorded in Sytek's last quarter ended in February. The privately held broadband vendor was forced to layoff 46 workers in an effort to streamline operations.

Sytek has attributed the loss to a double whammy: a softening in the asynchronous terminal-to-host market, which represents 50% or more of its revenue, and the loss of an OEM contract to manufacture adapter cards for IBM's PC network. The IBM deal represented 49% of Sytek's revenue in fiscal 1986, McFaul said.

"That 49% was and is tough to replace," he said, adding that Sytek "will never execute a contract with another company that would account for nearly as large a part of [Sytek's] revenues." Meanwhile, Sytek is looking to compensate by focusing on end-user sales.

The company was successfully adjusting to the loss of IBM's business, but then the terminal-to-host market unexpectedly softened. "It was an unfortunate thing," McFaul said. Once again, Sytek's game plan calls for adjustment. Although there are no plans to abandon its most profitable market, Sytek will devote fiscal 1987 to diversification, adding Ethernet and possibly Starlan to its product offerings, McFaul said.

"I think it's fair to say the terminal area is gradually being replaced by the PC, which offers insight into the PC-based solution we [will offer]," he added.

Adding to the cloud over Sytek is a recent decision by majority shareholder and early inves-

Continued on page 90

NCR

Court approves Iomega class action

BY ALAN J. RYAN
CW STAFF

ROY, Utah — Iomega Corp. announced recently that the District Court of Connecticut had entered its preliminary approval of a settlement agreement relating to the class action and derivative action pending against the company and some of its directors. The actions stemmed from Iomega's failure to meet its projected sales and earnings for fiscal 1986.

Under the settlement agreement, Iomega would pay the plaintiff class $250,000 plus an additional $750,000 under mutually agreed upon terms and conditions. The company would also issue a total of 1.2 million shares of a new class of Series A convertible preferred stock that, under certain conditions, would become convertible into common stock of the company.

The settlement is subject to notification of all members of the plaintiff class and final court approval, a company statement said.

The company's results of operations for the second quarter of 1987 will reflect a charge for the settlement.

For its first quarter ended March 29, Iomega posted a loss of almost $17,000, or $1.15 per share, on sales of $16.6 million. In the like quarter last year, Iomega had income of $4.57 million, or 30 cents per share, from sales of just more than $35 million.

The decrease in sales was attributed to a reduction in sales to distributors that were working down an overstocked condition in Bernoulli Box products, according to Michael Kucha, chief executive officer.

Analyst James Stone of Shearson Lehman Brothers, Inc said Iomega flooded its dealer channel with too many products in December 1986, creating excess inventory.

Layoff woes

In early March, Iomega announced a 183-employee permanent reduction in its work force and a 182-worker temporary layoff. Those cuts followed a 150-worker reduction in December 1986. At that time, analysts predicted that Iomega would suffer a 10 to 30 cents per share loss for the period.

One analyst who follows the developer and manufacturer of cartridge-based disk mass-storage products said the recent quarterly results show that Iomega "is moving far too slowly from the old [Bernoulli Box] product to its new product. Based on losses and the need for cash, this company is in serious trouble."

But Stone said that while sales were lower than expected, a healthier current quarter is expected. "In my last conversation with the company, they said they were looking for revenue in the $20 million range this quarter. Right now, they're going through a product transition."

Sytek

FROM PAGE 87

tor General Instrument Corp. in New York to divest itself of a 57% stake in the company.

As part of a corporate restructuring, General Instrument decided to divest itself of holdings in several subsidiaries unrelated to its core businesses, including Sytek.

General Instrument has denied reports that Sytek was unprofitable, and Sytek has referred all questions concerning the stock sale to General Instrument.

Ed Kearney, General Instrument's vice-president of investor relations, stressed that his firm's decision to divest should not reflect negatively on the company.

"We think very highly of Sytek," Kearney said.

A number of companies have expressed interest in purchasing the Sytek stock, but Kearney declined to identify them or to say whether prospective buyers are in the networking business.

HP earnings

CONTINUED FROM PAGE 87

1986, the company said.

Sales for the quarter totaled $2.02 billion, up from the $1.78 billion recorded in the like quarter in 1986. Revenue from U.S. sales and service was $997 million, up 8% from the same quarter last year. The company's international sales rose 19% to $1.02 billion.

Earnings were $162 million, or 63 cents per share. In the second quarter last year, earnings of $127 million, or 49 cents per share, were reported.

John A. Young, HP's president and chief executive officer, attributed the increases in part to the company's new product cycle and a rebound in the computer industry. He said orders for HP's peripheral, network and component products have been increasing.

Analyst Peter Heymann of Drexel Burnham Lambert, Inc. said that while HP's expense control could have been better in the quarter, "in general, the quality of earnings was very good. There were no unusual factors in the overall earnings report."

Heymann said that the breadth of orders in the U.S. has improved. "We saw a double-digit increase for the first time since the last cycle in the electronics industry" about four years ago, he said.

For HP's third quarter, Heymann forecasted a small sequential improvement. "We'll see something more in the 5% range," he said. At its current earnings run rate, Heymann said HP "is still going to score substantial improvement in its bottom line for fiscal '87."

Ashton-Tate, the Torrance, Calif.-based marketer of data base management systems, word processing, graphics and integrated software, reported income for its quarter ended April 30 of $9.09 million, a 77.5% increase on income of $5.12 million for the same period last year.

Earnings were 36 cents per share, compared with 23 cents per share for last year's first quarter. Sales for the period were $60.21 million, up 46.2% from the $41.17 million reported for the first quarter last year.

Ashton-Tate's earnings were in line with expectations, said analyst Bob Therrien of Paine Webber, Inc. "If anything, I think the earnings were a little bit conservative this time," he said.

Charlotte Walker, an analyst with L. F. Rothschild, Unterberg Towbin, said a careful analysis of the numbers reveals that they were "a little soft in some areas," but "it's nothing to be alarmed about.

"Revenues of $60 million were down a couple of million from the fourth quarter, [which is] going against the trend set by Microsoft Corp. and Lotus Development Corp. of sequential improvement in the first quarter."

Walker said it was noteworthy that domestic sales for the period were down 13% from the January quarter, while international sales accounted for 30% of the recent quarter's sales. She said the Multimate product slowed in growth sequentially.

Ashton-Tate Chairman and CEO Edward Esber Jr. said the firm has made its products available on 3½-in. disk formats to run on the IBM Personal System/2 family, which "is just the first step in our plan to optimize our products to take full advantage of these new systems."

Firms chip in for Sematech

BY JAMES A. MARTIN
CW STAFF

DALLAS — Semiconductor executives meeting here recently outlined an operating plan for Sematech, the U.S. chip-manufacturing consortium, that included raising $250 million a year from private industry and government funds.

Sematech is the planned cooperative effort among U.S. semiconductor companies to combine manufacturing technology and experience in an effort to combat Japanese and other offshore competition.

The plans were developed by a Semiconductor Industry Association task force that appointed itself as interim board of directors for Sematech and said it would immediately begin efforts to raise $125 million per year from the electronics industry.

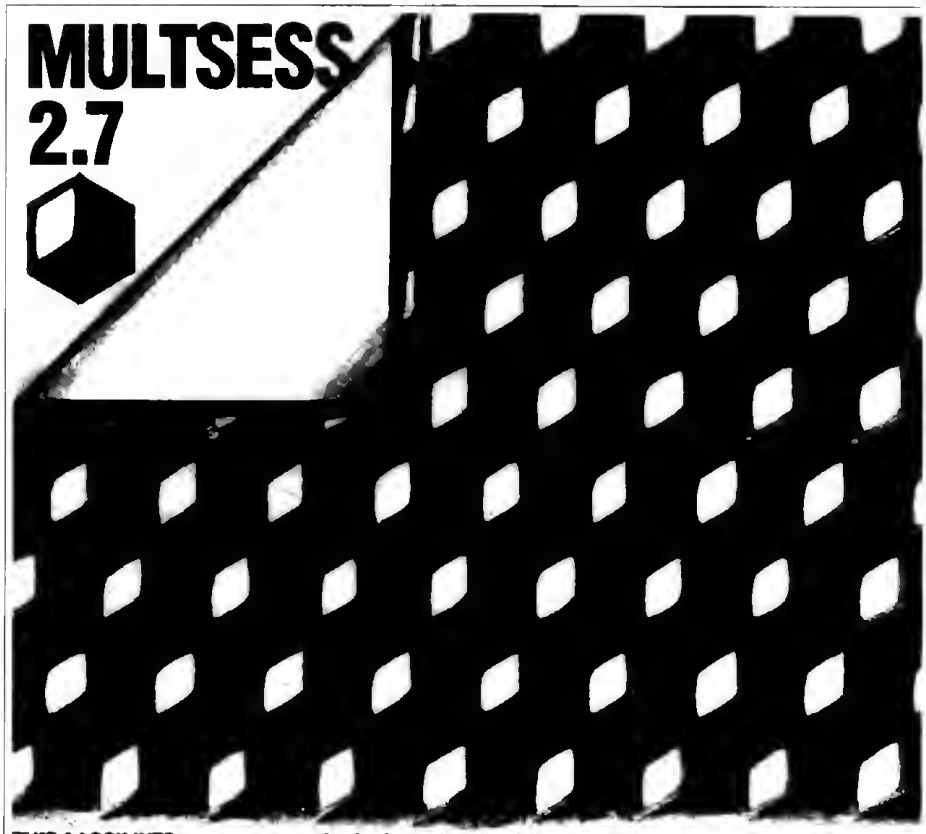
Matching funds will be sought from the government, with a provision that federal aid be restricted to six years.

Although the board did not specify from which agencies they expect funding, the Department of Defense has already shown great interest in the consortium.

A search for a manufacturing site will begin immediately, as Sematech's plans include producing its first chips by late 1988.

"We believe it is absolutely essential that Sematech gets launched without delay to stop the erosion of America's semiconductor industry by subsidized foreign competitors," such as Japan, said Charles E. Sporck, president of National Semiconductor Corp. and chairman of the Sematech committee.

Some have compared Sematech — in theory — with Microelectronics and Computer Technology Corp., better known as MCC, an Austin, Texas-based cooperative focusing on developing new, shared technologies among competitive companies. However, Sematech most likely has a better chance of success than MCC, according to Edward C. White Jr., a semiconductor analyst with E. F. Hutton & Co. in New York.



TAKE A LOOK INTO YOUR VTAM NETWORK

The best way to increase power is to increase productivity. Our portfolio of Software Solutions will allow you to increase your systems productivity, your users affectiveness, and the power of your VTAM network.

MULTSESS, today's most efficient multiple session manager, eliminates repetitive logons/logoffs, and provides a more friendly view of the complex online environment.

And now, this Solution just got better!!

ANNOUNCING . . . MULTSESS 2.7

We are proud to announce the new features and enhancements of Version 2.7 and ask you to TRY US

Look what we've added.

- Truly dynamic panel mode
- Convenient user axit points
- Application messaging
- Network response monitor
- Application screen print facility
- MVS/XA support

Better than before, MULTSESS SOLVES ACCESS PROBLEMS

- Supports 255 concurrent sessions per user
- Allows "Jump Kay" session switching
- Permits session portability

PROMOTES FLEXIBILITY

- Dynamically builds custom panels
- Supports full cross-domain communication

FACILITATES CONTROL

- Interfaces to major security packages
- Eases HELP DESK support

All these features are available whether you have just a few or MANY users that require them!

So as you look into your VTAM network, and you consider a session manager, STOP. Give us a call. We'll be glad to send you a free, no obligation trial.

You can be sure . . . if it's Westinghouse

(800) 348-3523
(412) 256-2900 in PA

Westinghouse Electric Corporation
Management Systems Software
PO Box 2728
Pittsburgh, PA 15230-2728

Westinghouse
SOFTWARE **SOLUTIONS**

Sun moves to buy Trancept for $5M

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. last week announced it has signed a letter of intent to acquire Trancept Systems, Inc. for approximately $5 million in Sun common stock.

The acquisition is subject to approval and execution of a definitive contract, regulatory approvals and approval by Trancept shareholders.

Trancept is a privately held company that develops and sells applications and graphics-accelerator products. It supplies TAAC-1, which it claims increases the performance of computation- and graphics-intensive work in applications such as geometric modeling, medical imaging and broadcast animation.

Sun supplies distributed computing systems, including workstations and servers, networking and data communications products and Unix system software.

Sun rises

FROM PAGE 87

cepted standard.

Two Korean manufacturers already have equity stakes in their respective U.S. sales partners. Daewoo Telecom Co., South Korea's pioneering microcomputer maker, has purchased a controlling interest in Cordata. Hyundai Electronic Industries, Ltd. owns a piece of Blue Chip Electronics, Inc. in Chandler, Ariz.

Two other firms, Lucky-Goldstar Group and Samsung Co., have begun marketing PCs under their own names. Rumors abound that Hyundai is setting similar marketing plans as well.

And why not? Brand recognition has become the name of the PC game. Hyundai has won accolades for its automobiles. Samsung and Lucky-Goldstar have become recognized names in consumer electronics. Like the Japanese, the Koreans do not like to put their own names on a product unless it has a better-than-even chance of winning. Perhaps they smell a winner?

Preparing for the worst

Meanwhile, the Koreans' U.S. sales partners are probably preparing for the worst.

Start-up Blue Chip Electronics shipped 30,000 PCs last year, according to Framingham, Mass.-based market researcher International Data Corp. (IDC). The company has an exclusive relationship wth Hyundai on two products, the PC Popular — an IBM PC XT-class machine with a speedier microprocessor, priced at $499 — and its entry-level Blue Chip PC.

Leading Edge Hardware Products, Inc. in Canton, Mass., — which last year shipped 185,000 Model D IBM PC-compatible computers made by Daewoo, according to IDC — has to be questioning the impact of its supplier's ownership position in Cordata. Leading Edge has an exclusive relationship with Daewoo through 1989.

Even if the Koreans attempt to have a go at it themselves, U.S. vendors need not fear. Some other country is bound to materialize, offering cheap labor rates and technological expertise. Moreover, the Koreans still have to strengthen their U.S. distribution channels and learn how to work with resellers here.

One thing is for sure: PC prices will continue to plummet, bringing lower cost computers to the masses. That's good news for consumers but bad news for domestic suppliers.

Alper is *Computerworld*'s Mid-Atlantic bureau correspondent.

What's the Score in Distributed Matrix Switching?

1		
2		
3		
4	[illegible]	
5	How many latest-generation distributed switches have been shipped to customer sites?	200+
6	Can references be contacted, with sites visited?	Yes
7	How large is the vendor's in-house service organization?	75
8	Is local customer service available from vendor's in-house organization?	Yes
9	Is performance monitoring integrated in the distributed matrix switch?	Yes
10	How much distance does the switch allow between DTE and DCE?	600'
11	Does the switch provide V.35 support with no sacrifice in RS-232 ports?	Yes

It's time to add up the score in the distributed communications matrix switch marketplace. Tear out this ad, and compare the capabilities and availability of competitive distributed switching systems with the proven criteria established by our Data Switch *Galaxy-Plus*.

At Data Switch, we know that *Galaxy-Plus* is the most advanced, *proven* switch available today. And, we know that no competitor within our markets can match the service and support we offer.

Prove it to yourself. Try to find any competitive switch that matches the 11 evaluation criteria set by *Galaxy-Plus*. Then call our Data Path Management Specialists at 1-800-326-3279; in Connecticut, 926-1801; or write Data Switch Corporation, One Enterprise Drive, Dept. 30, Shelton, CT 06484. We'll be pleased to demonstrate that *Galaxy-Plus* stands alone as the only choice for your data communications network application. At Data Switch, we deliver on our promises.

DATA SWITCH

The Data Path Management Company

DB2 or SQL/DS PROJECTS?

Call the

DB2 TEAM

from the

Computer Consulting Center, Inc
575 8th Ave., NY, NY 10018
(212) 564-9088

Reasonable rates on DB2 Design, Programming & Training

THE RELATIONAL PROBLEM JUST GOT SOLVED

PowerHouse® brings solutions to typical relational DBMS problems

New PowerHouse versions for Digital and Data General

The latest versions of the PowerHouse development language on Digital Equipment's VAX and Data General's ECLIPSE MV computers solve many of the problems associated with adopting a relational DBMS. Because PowerHouse supports both vendors' relational databases and dominant file systems, you're guaranteed integration, compatibility and performance, and 'production' development power.

Integrate new applications with existing data

New applications built in a third party relational DBMS won't necessarily integrate with your existing data. Because PowerHouse supports Rdb/VMS and VAX RMS, and DG/SQL, INFOS II, ISAM, DBAM and AOS/VS, you're free to build new applications on a relational database and integrate them with your existing ones. That means you're not 'locked-in' to a proprietary relational DBMS and 'locked-out' of your existing data.

PowerHouse provides compatibility and performance

Implementing relational technology can present compatibility and performance problems. Not with PowerHouse — it's tightly integrated with Digital's and DG's databases and operating systems to guarantee you exceptional 4GL/DBMS performance. You enjoy the combination of a fast-execution language and databases optimized by your computer manufacturer. And wherever they take their hardware and software — your applications and data will go too.

Development power for 'production' applications

PowerHouse gives you total development capability in one language, and not a collection of weak DBMS utilities and interfaces. Regardless of which database you're using, PowerHouse gives you advanced, dictionary-driven development power to prototype and build 'production' commercial applications

And Cognos has a full-service organization to back you up. For more information, call toll-free, 1-800-4-COGNOS. In Canada, call 1-613-738-1440. In the U.K., call +44 344 486668. Or call on any of our 40 Cognos offices around the world and find out why 7,000 customer sites use PowerHouse

COGNOS

Cognos Corporation 2 Corporate Place 1-95 Peabody Massachusetts 01960
PowerHouse is a registered trademark of Cognos Incorporated
Rdb, RMS, VAX and VMS are registered trademarks of Digital Equipment Corporation
ECLIPSE, MV DG/SQL INFOS ISAM DBAM and AOS VS are registered trademarks of Data General Corporation

MCC's Dove

CONTINUED FROM PAGE 87

chitectures program.

"In general, I think [the participating companies] are working on the right problems," Dove says. "We'll probably make some adjustments, and we're looking at some new programs — which would be in some areas to augment the ones that we have and, perhaps, attract some new shareholders." He will not discuss any future programs but does say that "fifth-generation technology will be very important to our long-range plans.

"The so-called fifth-generation technology — symbolic processing and artificial intelligence — is inherent in almost all of our programs here. In six or seven, it is either the driving force toward which the research is directed or it is being used as a development tool or productivity tool," Dove says.

"American companies have been the leading technology provider for the first four generations. If MCC can play a small role in making American industry a continuing leader in fifth-generation technology, then we will have accomplished our purpose," he adds.

> "THE SO-CALLED fifth-generation technology — symbolic processing and artificial intelligence — is inherent in almost all of our programs here. In six or seven, it is either the driving force toward which the research is directed or it is being used as a development tool or productivity tool."
>
> GRANT DOVE
> MICROELECTRONICS AND COMPUTER TECHNOLOGY CORP.

According to Dove, the research being done at MCC is one way to help the American computer industry to more effectively compete with the Japanese. However, he said, "Our job is to keep our eyes on what we need to do and give ourselves more capabilities."

He added, "I think it's important to show that this does work, and that it makes money for our shareholders."

But Dove is approaching his new job with a mix of optimism and caution. He says he has worked closely with interim CEO Joseph Boyd to adjust growth rates and control expenses to be sure MCC will not overshoot its budget for 1988 in the event that additional shareholders are not secured. He says things seem to be reasonably secure, as there are 16 companies that have committed to the consortium for next year.

For the job recruitment firm hired by MCC to find a new leader, Dove seemed a likely choice because of his management and R&D experience. The firm pursued him, although Dove claims he was not looking for a new job, and he agreed to an interview.

Diverse duties

During his tenure at TI, Dove has worn many hats. Currently, he is executive vice-president, with duties including the management of Geophysical Service, Inc. and corporate development, which includes TI's central R&D activities, strategic planning and economic analysis.

Since his appointment was finalized in early March, Dove has been devoting one or two days each week to MCC, acting as a consultant to the consortium until his term goes into effect. In July, he will take the MCC helm full-time.

Meanwhile, he spends his MCC time looking back at the original documentation that led to the founding of MCC to see whether the group is meeting its original goals. "We're in the process of seeing how well we're doing in terms of the near-term objectives that we've set and where we should be in 1990, 1995 and 2000. I feel pretty good about what they've done," he says.

Still making technology inroads

Critics of the consortium have said that the group has yet to make any major technological advancements. But Dove is quick to point out that in this year alone, there have been technology transfer announcements, such as an electronics technology transfer currently being used in a new laboratory set up by Boeing Electronics Co.

MCC has long-range goals for each of its R&D programs; the shortest one is six years from the time research started. However, Dove says, "They had planned early spin-outs of along-the-way technology, and those are happening in computer-aided design. We'll have some significant shipments of capabilities for beta test this year."

Some critics have said MCC is not showing much gain on foreign competition. "MCC is aimed at helping American companies and American industries become more competitive in the world market," Dove says. "We watch very carefully what the international companies are doing, but we are not hung up on that."

The appointment of Dove concludes a search conducted by a five-member committee of MCC's board of directors, chaired by John Lacey, executive vice-president of Control Data Corp.

There's one PC-to-VAX Connectivity Package that won't do this to your VAX . . . CommUnity™-DOS.

Now you can give your IBM PCs access to the full power of your VAX without your VAX wishing you hadn't.

CommUnity-DOS from Technology Concepts Inc. is a *true* native implementation of the Digital Network Architecture. That means you get DECnet's full networking capabilities and power on your PCs, XTs, ATs or compatibles. And unlike other connectivity packages CommUnity-DOS gives you all this *without the need for additional hardware or software in your VAX* and without compromising the integrity or future compatibility of the VAX/VMS.

CommUnity-DOS is a high-performance software package. It converts IBM or compatible PCs into *true nodes* capable of accessing all host systems in a Phase IV DECnet network, local or remote. Your PCs get complete sharing of VAX data files and all the functionality of DECnet via Ethernet — *not simply terminal emulation*. CommUnity-DOS gives you task-to-task communications, virtual terminal capabilities, network management and true file system access, all at speeds measured in hundreds of thousands of bits/second.

CommUnity-DOS gives you high-performance by off-loading network protocol processing to an intelligent Ethernet controller*, minimizing memory requirements and CPU demands on your PC.

Connectivity. Compatibility. Accessibility. That's what you need to create a real sense of community in your organization. And that's exactly what CommUnity-DOS was designed to provide.

Contact the Product Sales Department at Technology Concepts today, at 617-443-7311, ext. 221.

Technology Concepts Inc.
A Bell Atlantic Company
40 Tall Pine Drive, Sudbury, MA 01776 • 617-443-7311

* Excelan EXOS-205 or Ungermann-Bass Personal-NIU

DEC, DECnet, and VAX are trademarks of Digital Equipment Corporation. IBM is a registered trademark of International Business Machines Corporation. Ungermann-Bass and Personal-NIU are registered trademarks of Ungermann-Bass, Inc. EXOS is a trademark of Excelan, Inc.

The Unfulfilled Promise of High Technology

In the wake of [illegible] promise of today's state [illegible] can be dead weight [illegible] after the state [illegible]

[illegible] term technical alternatives [illegible] of the undertow from manufacturers marketing cycles

Find out what the Fortune 500 already know. Leasing is a powerful financial tool. Are you using it?

Calculate Your Financial Risks... Then Call Comdisco

Comdisco Inc

(312) 698-3000

EMPLOYMENT TODAY

Strengthening a weak resume

Employers seek best candidate fit, not necessarily ideal background

BY NANCY BLUMENSTALK MINGUS
SPECIAL TO CW

The Want Ad reads: "Bachelor's degree required." Is it? Rarely. The ad continues: "Three to five years Cobol programming in a VM/CMS, CICS, IDMS environment." Really? Probably not. "Two years supervisory experience necessary." Will they dicker? Maybe.

Seldom is there a perfect person for the job. Managers today look for a good fit between job and candidate, but this attitude does not mean an exact match to the job specifications. Lacking education, technical expertise or management experience does not necessarily pose the blockades most MIS professionals assume it does.

Many job seekers overemphasize education. Entry-level jobs are the only ones that absolutely require a four-year degree. For example, for a programmer trainee, "that degree is their only credential," says Laurence Brody, senior vice-president of systems for Manufacturers and Traders Trust Co. in Buffalo, N.Y. In fact, as experience increases, a degree becomes less important. Once a person achieves 10 or more years of experience, a degree is generally irrelevant. Philip Nichols, national services manager for Cullinet Canada, Inc., says a degree "only proves that you have spent the time." Pursuing a degree is still personally rewarding and beneficial when considering a career change. But candidates should not expect an automatic impact on the job.

As an alternative to a four-year degree, many MIS professionals are turning to certifications such as the Certified Data Processor (CDP) and Certified Systems Professional (CSP) programs offered by the Institute for Certification of Computer Professionals in Chicago. Unfortunately, at least in the business world, these certifications are not widely recognized as valid credentials. Many managers are not even aware of the requirements for a CDP or CSP certificate. If they are, they use them more to "show a seriousness about an MIS career, not as a measurement of what you know," says Richard Beldon, data processing placement counselor for Robert Half of Buffalo.

Academia, on the other hand, pays more respect to the certifications. Colleges and universities often view a CDP certificate as equivalent to a master's degree when they hire professors.

Technical experience is crucial in technical positions, yet specific product experience may not be. For example, a person with strong Cobol skills can program on an IBM system or a Digital Equipment Corp. VAX with minimal adjustment. If a person has the "correct perspective on an overall job approach and is willing to grow and develop," Nichols would hire that person, he says, then "round them out once they're on board."

> MANY job seekers overemphasize education. Entry-level jobs are the only ones that absolutely require a four-year degree. For example, for a programmer trainee, that degree is their only credential.

Job seekers with no management experience would not be as fortunate, however. "I would not hire someone into a management job without experience. I might bring them in at another level and promote them. I don't want someone to discover his management style here," Nichols says.

On the other hand, other companies are more willing to consider informal management training. "All of us have some management experience," Brody says. "Someone who had supervised three to eight people could manage 10 to 15. If I'm hiring someone to supervise two to three people, prior supervisory experience is not essential."

Drafting the resume

Even though managers are willing to accept people with some gaps in education or experience, MIS professionals must still present themselves in a positive light. Several criteria will help MIS professionals fill gaps in their resumes by stressing the experience they possess.

What really sells MIS managers is the candidate's achievements. For example, Brody says he checks to see if the person "has a clear record of accomplishment and has been recognized for it. That is, promotions within a shop, not from external job switches." The resume should stress major accomplishments for each position held, while pointing out any internal promotions. List any professional affiliations. Leadership in MIS organizations can be advantageous. "If a person has no opportunity to demonstrate management on the job, management outside the job can demonstrate the same potential for leadership," Brody says.

Strong communication skills are also highly valued. Although many managers, like Nichols, prefer to learn about communication skills in a "good, long, old-fashioned interview," candidates should list any published pieces or presentations on their resumes.

The last information to include is education. List colleges only; high schools are not important. If applicable, add any recent courses taken at schools or technical institutes that did not count toward a degree but provided additional hardware and software experience.

Once the resume is ready, should it be printed or typed? Printed resumes tend to imply holes being covered by fancy print. They are also less flexible and less specific to the position being sought. "They're a waste of money," Beldon says.

With the resume prepared, the candidate should approach the interview cautiously. "We all try to put ourselves in the best light, but there is a point where self-promotion can become misrepresentation," Brody says. "It's the responsibility of the hiring company to confirm skills, but it's the applicant's duty not to mislead. If someone knowingly misrepresented his experience, my inclination would be to reverse the hiring mistake."

Blumenstalk Mingus is a free-lance writer based in Buffalo, N.Y.

% ATTN: GURUS

Immediate openings for System V / 4.3 BSD UNIX ® operating systems kernel designers and internals GURUS

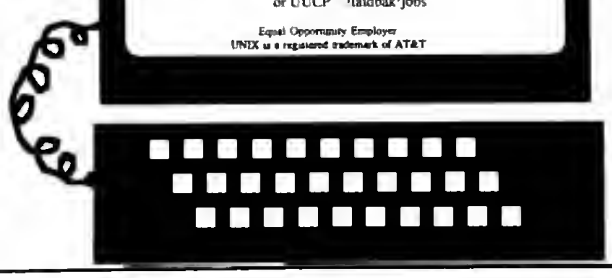
Current projects involve design, porting, and performance evaluation for the following architectures: multi-processor supercomputer, N cube, mini, and 680x0 machines

Locations include our headquarters in Naperville, IL with some travel/assignments in AZ, MN, CO, and OH

For consideration phone 800-524-8649 ext. 630, or send your current resume to

Lachman Associates, Inc
1901 North Naper Blvd.
Naperville, IL 60540-1031
Attn: CW
or UUCP: !laidbak!jobs

Equal Opportunity Employer
UNIX is a registered trademark of AT&T



TIMING IS EVERYTHING

And Now is the time to let our expertise place You in an exciting career opportunity in sunny Florida. Available opportunities include

WEST COAST

·Software Engineers	
Intel 8086, PL/M, ADA	to $50K
·Systems Analysts	
SY 38, RPG	to $34K
WANG, RPG	to $25K
· Programmer Analysts	
IMS, PL1, ALC/BAL, IBM MF	to $45K
DEC/VAX, PASCAL	to $43K
DEC/VAX, VMS, C, ASSEM	to $40K
DEC/VAX, VMS, C, UNIX/XENIX	to $37K
COBOL, OS/MVS, CICS, IDMS	$33K
ASI-ST, Billings	$32K
WANG/RPG	$25K
OS/MVS, CICS	to $24K
MICROVAX II, DIBOL	to $22K

EAST COAST

·Software Engineers	
UNIX, C, X 25	to $50K
UNIX, KERNEL	to $50K
·Project Leader	
WANG, BS degree	to $45K
·Programmer Analysts	
IBM, Mortgage Banking	to $45K
IMS or DL1	to $42K
IBM, CICS	to $42K
Tandem, COBOL	to $37K
OS/MVS, COBOL	to $36K
Burroughs, Banking	to $30K

It's Summer 87 do you know where your future is right now?

COMPUTERPEOPLE

12225 28th Street North
St. Petersburg, FL 33702
(813) 576-2878

2005 W. Cypress Creek Rd., #3
Ft. Lauderdale, FL 33309
(305) 771-8603

COMPUTER PROFESSIONALS

An international **Fortune 500** electronic manufacturing company headquartered in the Southeast has an immediate opening for a lead Systems Programmer and an experienced professional to manage our Data Processing Operations

If you are qualified and desire to contribute to our Company's rapid development, we invite you to consider our employment opportunities.

Systems Programmer

- Responsible for installation and maintenance of operating system software on an IBM 4381 mainframe
- Experience with VM/HPO, DOS/VSE, VTAM, NCP, and CICS
- Desire to lead in a DOS/VSE to MVS conversion effort
- 6+ years experience as a System Programmer

Data Processing Operations

- Manage a team of seasoned operations personnel utilizing an IBM 4381 mainframe in a national networking environment
- Knowledge in the COPICS Manufacturing, and McCormack & Dodge Financial Applications environment
- MVS background with desire to assist in DOS/VSE to MVS conversion
- Experience with VM, DOS/VSE, VTAM and CICS Operational environment
- 6+ years in operations

Both positions require a BS in Computer Science or equivalent experience, and involvement with a large scale IBM mainframe If your speciality is described above and you are interested in joining a future-oriented company at our Corporate Headquarters

Please send resume with salary history in confidence to

CW 4918
Computer World
Box 9171
Framingham, MA 01701-9171

An Equal Opportunity Employer M/F/V/H

DATA PROCESSING

Advanced Systems Division

ONE OF THE 100 BEST COMPANIES TO WORK FOR IN AMERICA.

—Levering, Moskowitz & Katz

When asked why Northrop was listed in this elite group one employee replied "because of the friendly down-to-earth atmosphere"

At the Advanced Systems Division in Pico Rivera, Southern California, our data processing team demonstrates this distinctive spirit of cooperation and comradery You can join them in a state-of-the-art computing environment in one of the following positions

PROGRAMMER ANALYSTS—BUSINESS SYSTEMS

Requires at least 2 years experience in a large IBM mainframe environment utilizing OS or MVS/XA, COBOL, TSO, ISPF JCL, PANVALET and IMS DB/DC Also requires working knowledge of COBOL, IMS, DYL/280, 4GL, structured methods and experience with one of the following systems.

- **Financial and Administrative Systems:** Development and enhancement of cost control and configuration management systems utilizing McCormack and Dodge financial software packages
- **Manufacturing Systems.** Installation and enhancement of McCormack and Dodge MRP II software package.
- **Integrated Logistics Support (ILS) Systems:** Development and enhancement of ILS systems to support provisioning and materiel supply

OFFICE AUTOMATION

- **FOCUS End-User Support:** Implement FOCUS in an MVS-TSO environment, including start-up guidelines, procedures and provide end-user consulting to a broad range of FOCUS users Provide "hotline" support and organize local FOCUS users group and newsletter Assist users in requirement definition, application and database design as well as FOCUS problem solving Requires strong communication skills and 3-5 years with FOCUS, including FOCUS Security, SU, TSO, CList and ISPF Dialog Manager Information Center experience a plus
- **Wang Network Specialist** Install administer and maintain our Wang network hub Requires working knowledge of VS hardware and software configuration, performance optimization, network change control and systems administration Also requires experience or willingness to cross train in IBM SNA CICS and DISOSS

DATA BASE ADMINISTRATOR

Perform data analysis, modeling and normalization activities in support of a three schema data driven approach to application systems development Develop logical and physical data structures, supervise test and production data base maintenance and support activities, provide data base performance analysis and tuning activities Develop data base related standards and procedures

Senior level and specialist level positions are available for individuals with at least 8 years data processing experience including IMS DB DC applications analysis and programming, and 3-5 years recent background as a Data Base Analyst or Administrator in an IMS DB DC and DB2 environment Background includin Manufacturing Engineering and or Logistics applications preferred

For this position, please send your resume with salary history.

Please send your resume to. Steven Martin, NORTHROP ADVANCED SYSTEMS DIVISION, Employment Office, Dept. CW2519, P.O Box 1138, Pico Rivera, CA 90660-9977. Northrop provides its employees a competitive, comprehensive benefits package

Modem Users You can access a complete listing of career positions with your home computer and a modem Dial **(612) 941-5723** and enter the password "Career Access" for 24 hour information ***Bit settings data 8, stops 1, no parity, fullduplex, 300 1200 baud enter password (Career Access) (CR) upon entry***

CAREER ACCESS

PROOF OF U S CITIZENSHIP REQUIRED Northrop is an Equal Opportunity Employer M F H V

NORTHROP

Advanced Systems Division

SEATTLE, WASH.

SUPERVISOR TECHNICAL SUPPORT

Candidates for this position must have MVS system programming experience and good communication skills Environment includes MVS/SP JES2 ACF/NCP, VM SP, HSM RACF IMS, TSO/ISPF etc and a CICS network with 300 terminals This is an excellent opportunity for someone desiring a Technical Support management position supervising 3 people in a medium-sized MVS shop

Washington Natural Gas Company has a progressive people-oriented Information Systems Dept with excellent working conditions and competitive salary/benefits

Qualified candidates should mail a resume in complete confidence to

Attn. Ms. Lois Lord
Washington Natural Gas Co.
PO Box 1869
Seattle, WA 98111

No phone calls please

EQUAL OPPORTUNITY EMPLOYER

BUSINESS SYSTEMS DEVELOPMENT ANALYST

To provide sophisticated professional design computer programming and implementation of business systems necessary to permit the successful management of information Responsibilities include design development and implementation of business systems applications according to specifications using structured design and programming methodologies testing and implementation of programs assuring quality efficiency and satisfactory standards troubleshooting and debugging existing software development and use of productivity aids supervision of project team members application of knowledge engineering techniques and development of knowledge based systems and develop user interface for expert systems using Xerox workstations and knowledge engineering tools such as KEE

Requires MBA degree Requires educational course work including not less than 6 credit trimester hours (or equal semester or quarter hours) logical data base design not less than 4 trimester credit hours artificial intelligence and not less than 4 trimester credit hours expert systems Requires knowledge of systems analyses and design demonstrated by not less than 6 credit trimester hours (or equal semester or quarter hours) of systems analysis and 4 credit hours of systems design methods Requires documented applied research involving knowledge engineering and expert systems development using Xerox workstations and knowledge of engineering tools such as KEE Must have demonstrated knowledge of COBOL computer programming languages Salary $32 400 per year

Submit resumes to Mr Robert Tippetts #7 110, Minnesota Department of Jobs & Training 880 American Center Building, 150 E Kellogg Blvd St Paul MN 55101

SOFTWARE ENGINEER FOR SOUTHWEST AREA

If you are looking for a new exciting career opportunity and have any of the following skills IBM Series/1, CICS, PC Assembler C Language DEC VAX or Communications then we may have just the job for you We are a software and services company with a good reputation and a growth plan which demands talented people Send resume to

Box #CW-84916
Computerworld
P.O. Box 9171
Framingham, MA 01701-9171

FINANCIAL SYSTEMS ANALYST-design enhance & modify software for applications concerning financial transactions Must make frequent software modifications for firm s financial clients to allow them to develop new financial structures (such as securitization of debt) Work on applications pertaining to the feasibility of new financial structures & risk estimation 2 yrs exp or 2 yrs related exp Financial Systems analysis Bachelor s- Business Economics or Accounting or Computer Science w/business minor Must know FORTRAN Lotus 1-2-3 $32 000/yr 40 hr wk Send replies CW-84920 Computerworld Box 9171 Framingham MA 01701-9171 ATTN Mr E Mintz

PROGRAMMER ANALYST Analyze business data such as customer accounts for distribution business (banks transportation industry etc) & assist w/the gathering of additional data for design of new distribution systems used with microcomputer IBM with two terminals while in process of obtaining additional terminal Refine data & convert it to existing systems modify & improve utilizing computer science expertise prepare technical reports & design program according to such needs K ASSEMBLY COBOL C Language & PL-1 computer languages is read MS of Comp Sc w 2yrs exp or 4yrs college BA or greater in Comp Sc with 3yrs exp in the stated position $32 000 yr 40hrs wk J O #NY 8014813 DOT Code 012 187 066 Mail resumes to KYS Job Svc JO#NY8014813 250 Schermerhorn St 3rd fl Bklyn New York 11201

OVERSEAS ASSIGNMENT CONTRACT PROGRAMMERS

Hogan and banking experience required

Call or send resume to:

DP PROS, INC.
P.O. BOX 2229
BURLINGTON, NC 27216
(919) 222-8030

POSITION IN MATH & COMPUTER SCIENCE

2 positions one tenure-track and one visiting for Computer Scientist Mathematician to teach computer science and mathematics in a department of mathematics and computer science Teaching load is 2 courses per term for each of 3 terms Salary and rank dependent on qualifications and experience Knox is a selective liberal arts college Applications from women and minorities are strongly encouraged Send vita transcripts and 3 letters of recommendation to

Dennis M. Schneider, Chair
Dept. of Math & Comp Sci
Knox College
Galesburg Illinois 61401

NEW ENGLAND

AGL Sys Prog Prog Analyst Develop 4th Generation s w for IBM mainframes utilizing Assembler For rapidly growing co Mid $50 s

Systems Programmer Mid $40 s Opp w nationwide co IBM 3084 3090 OS MVS environ SNA NCP using Assembler Should have data comm or UCC 1 yrs exp

Sr Level Programmer Mid $30 s Must have VAX 11 AL COBOL Database exp 4 yrs exp

Gilbert Lane

221 Main Street
Hartford Conn 06106
Phone (203) 278 1100

FLORIDA

Dunhill

The National Personnel System

Exclusive national representation for experienced

Data Base Analysts/Administrators—
Data Analysts/Administrators—

with backgrounds in

DB2 IMS IDMS ADR SUPRA ADABAS ORACLE TERADATA

SUNBELT

A wealth of new positions are available right now in New England

Because of its high technology base virtually every type of computer environment and computer position exists. Many new and some of the most prestigious firms throughout the area have retained Source Edp to help identify skilled computer professionals. They offer very generous salaries, benefit and relocation packages.

You'll also find that opportunities for recreational and cultural pursuits are just as plentiful. The area is rich in water sports, skiing, tennis, golf — museums, theatres, universities, historic villages and landmarks.

To find out more about any position listed below — or others you might like to hear about — call Steve Jones toll-free day or night at 1-800-821-7700, extension 800-B. There's no cost or obligation to you and your inquiry will be held in strict confidence.

If unable to call, write: Steve Jones, Department 7013, Source Edp, P.O. Box 7100, Mountain View, CA 94039

Offer Rich Rewards $28,000–$55,000+

Call Steve Jones toll-free at 1-800-821-7700, extension 800B

Connecticut

Software Engineer (881-01) Large Fortune 500 company located in suburban Connecticut seeks an individual with VAX/VMS skills. Excellent career growth opportunities and exceptional benefits. ***To $44,000***

Senior Information Center Analyst · Management Potential (881-02) The nations third largest financial services organization seeks a microprocessor professional with three or more years of IBM mainframe experience and one or more years of information center experience. Plenty of opportunity for upward mobility. Beautiful rural Connecticut location. ***To $45,000***

Assistant Manager - (881-03) Progressive Fortune 50 financial services organization seeks a professional to supervise a staff of six on a CICS/IDMS foundation data base project in a 30 CPU environment. New corporate facility. Rural Connecticut location. ***To $45,000***

Network Systems Programmer · Growth Opportunity (881-04) Rapidly-expanding Hartford-based financial services firm seeks a professional with IBM SNA network systems programming experience. Knowledge of VSAM, NCCF and NPDA desired. Great location with excellent facilities. ***To $36,000.***

Programmer/Analyst · Learn CICS (881-05) One of the oldest and largest insurance companies in the world seeks professionals with policy management systems experience to join their progressive team. IBM, MVS, CICS, IMS shop. Hartford. ***To $28,000***

Consultants · Product Support (881-06) Nationally recognized vendor is seeking computer professionals to assist in the on-site installation, enhancement and training on various CICS and IMS-based application systems. 40% U.S. and Canadian travel. Wethersfield location. ***To $45,000***

Programmer/Analysts · More into Design Work (911-01) Stamford-based division of a Fortune 100 company seeks IDMS data base systems expertise. Knowledge of ADA/O desirable but not required. Will participate in major new development projects. ***To $38,000***

Programmers & Systems Analysts · Expansion Opportunity (911-02) Major manufacturer located in Stamford is expanding their MIS staff in new world headquarters. Use your experience in mainframe systems, microcomputers, fourth generation languages, data base analysis and design, financial or manufacturing to join one of the 100 Best Companies in America. ***To $50,000***

Senior Systems Analyst · Path to Management (881-09) New England firm seeks an Analyst with both IBM mainframe and IBM PC experience to build a new information center. The ability to interface with senior management desired. Knowledge of Fourth Generation and PC packages a plus. ***To $45,000***

Programmer/Analysts (861-01) Participate in three years of new development for on line data manufacturing, inventory control and financial applications. Opportunity to learn CICS in a large scale MVS environment. Connecticut. ***To $34,000***

Data Base Analysts (861-02) Get involved in significant growth. Participate in the evaluation of a new DBMS by evaluating and selecting DB2, ADABAS, IDMS and IMS. Fortune 500 company located in Southern Connecticut. ***To $50,000.***

DP Manager/System 38 (861-03) Become a key staff member in the implementation of manufacturing and other business applications for this $75 million Norwalk based division of an international corporation. ***To $45,000***

FORTRAN Software Engineer (861-04) Work with a variety of high-level languages including FORTRAN, PASCAL and C developing graphic interface software. These software products will connect mini and microprocessing capabilities into one very large real time processing system. Two to eight years of R/T software experience and a technical degree preferred. Wayland location. ***To $43,000***

Programmer/Analysts · Learn IDMS (861-05) Prestigious Meadowlands company seeks professionals with two or more years of COBOL and CICS experience. Excellent opportunity to learn IDMS and OS/MVS. ***To $42,000***

Programmer/Analysts (861-06) New corporate data center of a Fortune 100 company has major IMS/CICS development projects for Programmer/Analysts with two to seven years of COBOL or BAL experience. Outstanding benefits. Southern Connecticut. ***To $36,000***

Communications Engineer (861-07) Develop micro and mainframe communications software for this major vendor. SNA/SDLC x.25 experience sought. Micro/mainframe development experience helpful. Southern Connecticut. ***To $50,000***

Senior Systems Analyst (861-08) Corporate headquarters of a Fortune 100 firm seeks a Design and Development Consultant. Will interface with users and lead the Programmer project team. Southern Connecticut. ***To $36,000***

DEC Systems Manager (861-09) Become a key member of the technical support staff utilizing a full IBM, DB/DC SNA computer system as well as multiple DEC products and other minicomputers. Will supervise two Systems Programmers, provide technical support to MIS, R&D professionals, Ethernet and DECnet and evaluate new VAX hardware and software products. Will learn VAX and SNA. Experience should include DEC systems programming, coordination and implementation of new DEC hardware, supervisory experience and a college degree. ***To $45,000***

Programmer/Analysts · Learn IDMS (861-10) Prestigious company seeks professionals with two or more years of COBOL and CICS experience. Excellent opportunity to learn IDMS and OS/MVS. ***To $42,000***

Massachusetts

System 38 Programmer/Analyst · Develop New Financial Systems (931-01) Play a lead role in developing new financial and human resource applications in a distributed System 38/43XX environment. Potential cross-training on 4300 and CICS-based systems. Three years S/38 RPG III and financial, human resources or administrative systems experience desired. ***To $37,500.***

IMS Data Base Administrator · South Shore Location (931-02) New IMS shop situated in a beautiful seaside location seeks a Senior IMS Data Base Administrator to play a lead role, including the supervision of junior staff. Solid IMS DBA background with the ability to grow to a management role desired. ***To $50,000***

VAX Programmer/Analyst · New Systems Development (931-03) Clustered 8600 shop seeks an experienced COBOL Programmer/Analyst to play a key role in developing a new sales/marketing system. Three years VAX COBOL experience and excellent user interface skills desired. Boston location. ***To $34,000.***

Focus Specialist · New Information Center (931-04) Downtown financial services firm in Boston seeks mid and senior level Focus Specialists to develop Fourth Generation applications. Cross-training in DB2 and SQL provided. Solid mainframe Focus experience, excellent interpersonal skills and a four-year degree desired. Boston location. ***To $42,000***

IMS Programmer/Analysts · Training in DB2 (931-05) Major IMS shop in Boston is moving to DB2 and is commencing development of one of the largest and most sophisticated DB2 systems in the country. Full training in DB2 will be provided. Solid COBOL or PL1 experience under IMS desired. ***To $36,000***

Project Leader · Mutual Fund Systems (931-06) Leading financial services company seeks a take charge Project Leader to manage an eight-person team responsible for the development of a new mutual funds system. A solid project leadership track record in a financial services environment sought. Boston location. ***To $48,000 plus bonus***

Communications Specialists · Build a Nationwide Network (931-07) Play a lead role in implementing a nationwide brokerage network. Experience with SNA, X.25 and fault tolerant architecture are preferred. Financial services a plus. Boston. ***To $45,000***

Internal Consultant · VAX Systems (931-08) Entrepreneurial transportation firm in Boston seeks a VAX professional to serve as an Internal Consultant in the implementation of a distributed VAX environment. Will report to the Vice President of MIS. Individual should have a well rounded in-depth VAX applications and systems background and excellent user skills. ***To $45,000.***

Software Engineer · Learn Communications (941-02) Design and develop state-of-the-art networks in Northern Massachusetts with the leader in cluster and network technology. Experience with VMS, UNIX, C or Assembler desired. Outstanding relocation package and benefits. ***To $55,000.***

Course Developer · Mini/Mainframe Communications (941-08) Major computer vendor is expanding its internal course development organization. Will coordinate with R&D to develop courses prior to new product announcements. IBM mainframe software experience a plus. Lowell location. ***To $48,000.***

Operations Manager · Growing MIS Organization (941-09) Rapidly-growing financial institution seeks an Operations Manager with IBM, NCR and mortgage banking experience. Opportunity to manage a conversion to an IBM system and run the daily operations. Lowell location. ***To $45,000.***

New Hampshire, Vermont & Maine

Programmer/Analyst · IDMS Development (941-01) Join one of New Hampshire's leading technical organizations. Individual with IDMS and at least three years COBOL programming and analysis experience are sought to develop new systems. ***To $35,000.***

Information Center Manager · Run Your Own Show (941-03) Central New Hampshire organization seeks a manager with end-user mainframe software and PC skills. Benefits include full relocation and no state income tax. ***To $45,000***

Programmer/Analyst · VAX Development (941-04) VAX Programmers and Analysts with two to ten years experience in manufacturing or financial systems are needed to support this major manufacturing company's expansion. Vermont location near lakes and mountains. Full relocation provided. ***To $42,000.***

Senior Programmer/Analyst · CICS (941-05) Major central New Hampshire insurance company seeks an experienced CICS designer and developer with the ability to lead new project development activities. ***To $41,000***

Data Base Analyst · Senior Internal Consultant (941-06) Major Southern New Hampshire electronics firm seeks an internal Data Base Consultant. Will analyze corporate needs, propose solutions and design and implement new data bases. IMS experience a plus. ***To $52,000***

IDMS Programmer/Analyst · Live and Work in Maine (941-07) Northern New England-based insurance company is increasing its MIS organization. Several opportunities exist for IDMS Programmer/Analysts with three or more years of design and development experience. All new developments. ***To $45,000***

source edp®
Personnel Services

The world's largest recruitment firm devoted exclusively to the computer profession
Client companies assume our charges

Call today: 1-800-821-7700, ext. 800 B

NEW ENGLAND

BOSTON
SYSTEMS ANALYST - RETAIL
Nat l retail firm seeks sys analyst for hi vis liaison between users & MIS Must have 5+ yrs IBM MVS large scale design exp Oppty to author major upgrades to key apps in this Fortune 500 firm Salary to $45,000

BOSTON
VAX SYSTEMS ANALYST
Premier hi-tech firm seeks well versed VAX/VMS pro for new devel projs If you have maj proj accomplishments in mfg dist or fin l areas w/VAX this oppty is for you Tech bkgrd should incl COBOL BASIC or FORTRAN w/DBMS exp Salary to $42 000

BOSTON
SR CICS SPECIALIST
F/500 corp seeks tech talented pro for diverse projs w/online DBMS devel Environ is IBM 30XX IMS CICS COBOL + PC & mini networks Co is experiencing rapid growth & requires promotable take-charge types! Salary to $40,000

HARTFORD
PROGRAMMER/ANALYST
Area opptys for P/A's & S/A's w/CICS & IMS or IDMS exp 2+yrs exp req'd for an oppty to work in state-of-the-art IBM environ Our client will provide data base training for qualified candidates w/min 2 yrs COBOL Excellent oppty for indiv s seeking growth & advancement Paid reloc Salary to $37,000

HARTFORD
IDMS
3+ yrs IDMS programming sys exp req d for outstanding oppty with leading edge client DB design exp + ADSO a big plus Turn your IDMS skills into a financially rewarding position Excellent benefits Salary to $50,000+

PROVIDENCE
EDP AUDIT MANAGER
Fin l svcs firm seeks technically sound auditor to mge highly visible sys audit teams Your knowl of sys controls & standards will open the door to advancement and fin'l growth Min lvl for this coastal pos Salary to low $40's

ROBERT HALF
EDP PERSONNEL SPECIALISTS
Contact the Manager of any office listed below
100 Summer St., Boston, MA 02110
(617) 423-1200
111 Pearl St., Hartford, CT 06103
(203) 278-7170
900 Turks Head Bldg., Providence, RI 02903
(401) 274-8700
Client Companies Assume All Fees.

Software Development And Data Processing Professionals

Preview TRW's New Age Technology By Calling (213) 535-6632 Collect.

Representatives of TRW's Operations and Support Group, Southern California, will soon be in the areas noted below Take advantage of this opportunity to discover what New Age challenges, tools, and programs are available to you

In the near future we'll be interviewing in these areas

Boston
Dallas
Detroit
New York/New Jersey
Philadelphia
St. Louis
Washington, D.C

If you're abreast of America's leaders in advanced technologies, you're already aware of TRW's innovative research and development programs such as Strategic Defense Initiative Space Station, Milstar, Automated Message Processing Exchange and Space Telescope. Even more relevant to your expertise is the development of a number of state-of-the-art IDMS-based projects. ECATS (Employee Cash and Travel System) and DASARP (Data and Systems Architecture Redesign Project) are just two examples. Call to explore these career opportunities

Technical Consultant

You'll team up with software developers in resolving application problems in IDMS, JCL, TSO, SPF, and utilities. You'll also be responsible for helping identify training requirements and may develop and help support training programs.

In order to qualify, we require strong IDMS skills, a minimum BS and 5 years of progressive experience supporting large mainframe IBM operating systems and database management systems. Experience in PCs, interactive development tools, fourth generation languages, data communications and project management will be to your advantage.

Sr. Integration and Test Analyst-IDMS

You'll plan and conduct migration, integration and test of sophisticated on-line IDMS financial and business management systems. Qualifications include a minimum BS and 2 years on-line IDMS integration, migration and test experience.

IDMS Database Administrator

You'll be involved in the design and implementation of IDMS application databases, which includes both physical and logical design, database performance, system migration, unload/reload database restructure, and technical support for GLOBAL, DCMS and SYSGEN HELP. Finally, you'll provide support to the applications staff with coding and troubleshooting problems. To qualify, we require a minimum BS and 2 years DBA experience in a large mainframe IBM, IDMS environment

IDMS Programmer/Analyst

Responsibilities for this opportunity include user interface, system design, ADS-O and CDBDL coding, in a highly structured methodology environment. Programmer/Analysts work stations are IBM PC/AT based, having the latest development tools. You'll be required to have a minimum BS and 2 years software development experience in a large mainframe IBM IDMS ADS-O environment

IBM/PC Application Support Specialist

Your focus will be on internally developed project management software, providing product support and training, program design/implementation/testing and documentation. Knowledge of DOD procedures and C/SCSC will be to your advantage. Experience with dBASE III+, LOTUS 1-2-3 and PC programming is also desirable.

PC Programmer Analyst

You will be responsible for the design and development of user friendly applications for the IBM PC and compatibles, along with the development of system libraries, which include device drivers, communication handlers, keyboard and screen handling routines. Qualifications include a minimum BS and 3 years experience using 'C' 8086 Assembler, PASCAL or comparable language in a large IBM micro-mainframe environment

Micro-Mainframe Programmer Analyst

Areas of responsibility include the design and development of user friendly interfaces between micro and mainframe applications using commercially available products, requirements gathering, evaluation of current communication technologies and feasibility analysis. You will qualify with a minimum BS 3 years development experience ('C' PASCAL, ASSEMBLER or comparable languages) in a large IBM micro-mainframe environment along with a working knowledge of LAN micro-mainframe communications products and SNA

If you have experience in any of the above disciplines, and are ready to preview technology for a new age, call us collect. TRW offers outstanding salaries and benefits. If you prefer send your resume today to **TRW O&SG, R Chambers, P.O Box 188 Manhattan Beach CA 90266**

Equal Opportunity Employer
U.S. Citizenship Required

TRW

RSVP SERVICES

• *Analysts • Programmers*
• *Software Hardware*

AWARD-WINNING EMPLOYMENT AGENTS AT YOUR SERVICE

During more than two decades of matching high tech professionals and employers nationwide RSVP has won awards as top consultant for cooperative placements in both National Personnel Associates (240 firms) and the Middle Atlantic Assoc of Personnel Consultants

Our services to the select group of degreed experienced applicants we accept include resume development, arrangement of interviews and career guidance. Sorry no trainees, executives or aliens without permanent resident status

If you qualify call Howard Levin or Maureen McCue at 800-222-0153 or (in NJ) 609-667-4488 or send your resume to either address listed below. Our client companies pay all costs

RSVP SERVICES
One Cherry Hill Mall, Suite 700, Dept C • Cherry Hill NJ 08002
Dublin Hall, Suite 201 Dept C
1777 Walton Rd • Blue Bell PA 19422
(mail address only)
Member Firm
computer/net
national placement network

DIRECTOR OF SYSTEMS DEVELOPMENT AND APPLICATIONS
COMPUTER SERVICES DEPT

Longwood College
Farmville VA 23901

Experienced professional with strong managerial supervisory user support and systems analyst skills to direct unit of college computing services. Will provide leadership for small staff of programmer analysts and applications systems project leaders. Works closely with user representatives and project leaders in determining applications needs and in bringing users on-line. Experience in college environment with administrative systems preferred. Longwood's administrative applications systems run on an IBM 4341-2 under DOS/VSE. Experience in this operating environment and with ICCF CICS and VSE/VSAM strongly preferred. Experience with VM/CMS also strongly desired. Longwood's administrative applications systems Student Information, Financial Resources, Alumni and Development and Human Resources are products of Information Associates. Experience with IA software a definite advantage. Future directions point to administrative applications use of 4GL/DBMS. Experience in this environment is also advantageous. Experience with microcomputers and with micro-mainframe links and LANS also desired. The Director will report to the Associate Vice President for Information Systems. Salary range is $32 889.00 to $44 846.00. Please send resume with the names of 3 references to Employee Relations, Longwood College, Farmville, Virginia 23901. A completed Commonwealth of Virginia employment application form is also required and may be obtained and forwarded after completing the resume. COV applications may be obtained from Longwood College or any Virginia Employment Commission Office. Requests to Longwood may be made at the above address or by calling (804) 392-9381. Review of applications will begin June 1, 1987 and continue until an appropriate candidate is identified. Longwood College is an Affirmative Action/Equal Opportunity Employer

---

System Engineer: Working in our Voice and Image Division, candidate will utilize knowledge of natural language processes to develop an integrated digital network system which integrates voice and data. Responsibilities include setting up communications paths for the transfer of images between various locations relying on knowledge of image processes. Candidates will be expected to apply principles of theoretical aspects of computing to design more efficient software by providing smooth efficient introduction and development of office data. Requires a Masters Degree in Computer Science. Experience not required but graduate study must include one course in Natural Language Processes, one course in Theoretical Aspects Of Computing and one course of independent study in Image Processes. Salary $19.00 per hour, 40 hours per week, 8am-5pm Monday-Friday. Send resume with transcripts to verify course work and/or independent study to: Illinois Department Of Employment Security, 401 South State Street - 3 South, Chicago, Illinois 60605. Attn Mrs. S. Chalem Ref # 7086-S. AN EMPLOYER PAID AD

Computer Programming, Systems & Engineering Professionals

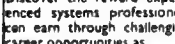
Through our screened & selected affiliates, we'll get your resume to employers with applicable job openings in your targeted geographic areas. ***Openings for systems software & applications programmers & analysts & HW/SW engineers.*** No fee, contract or obligation. At least two years experience required. U.S. citizens & permanent residents only. Send resume to:

NATIONAL CONTACT NETWORK, INC.
Ref CW, 2100 W. Chapel Ave
Cherry Hill, NJ 08002
(609) 667-4080
ncn

BURROUGHS

Immediate opportunities throughout the country for Programmers, Programmer Analysts, Systems Analysts and Systems Programmers with A Series, B5000, B6000 or B7000 mainframe experience. To confidentially explore new career opportunities, rush a resume or call Gary Repetto, CPC

DUNHILL OF ALBUQUERQUE, INC.
1717 Louisiana NE, Suite 218C
Albuquerque, NM 87110
(505) 292-1871
Exclusively Employer Retained



SAN FRANCISCO BAY AREA
There's GOLD in those skills
Discover the reward experienced systems professionals can earn through challenging career opportunities as

DBA'S
Physical or Logical Design
IDMS, IMS, DATACOM

LOGICAL OPTIONS
One Market Plaza, Spear Tower, Suite #2014
San Francisco, CA 94105 • (415) 777-2880

PROGRAMMER
P/A--RPG III
$40-55,000
Renowned non-profit broadcasting org seeks individuals expd with SYS 38 & RPG III. Structured programming a +

ROBERT HALF
OF NEW YORK, Inc.
522 Fifth Avenue
New York, NY 10036
212-221-6660

SHOWBOAT

ATLANTIC CITY

Casino, Hotel and Bowling Center

has excellent opportunities in a Management Information function. Large mainframe environment supporting 250 users.

M.I.S. DIRECTOR

Requires a college degree and 5-7 years of MIS management. The ideal candidate should have experience in the following areas:

- Proven track record in start-up operations
- System development methodology
- Hospitality industry experience
- Budgeting and planning
- Distributed processing
- Systems analysis
- Project management
- Fourth generation language

The following positions require: 3-5 years experience, casino, hospitality, or financial experience preferred, Tandem experience helpful.

SYSTEMS MANAGER
- 2-3 years Tandem applications language (TAL) required
- Data communication systems
- Applications programming and system programming environment
- Performance analysis

TECHNICAL DOCUMENTATION SPECIALIST
- Experience in creating and maintaining programmer level documentation including
  - data dictionaries
  - software flow diagrams
  - record layouts
  - process flow diagrams
- Perform QA alpha testing
- Develop and conduct alpha testing

USER DOCUMENTATION SPECIALIST
- User support and training
- Create and maintain user-level training materials
- Perform QA
- Hotline support
- Conduct user training
- Experienced in Beta level user testing

BUSINESS SYSTEMS PROGRAMMERS
- 3-5 years Cobol minimum
- Formal design specifications
- Tandem experience preferred
- SQL experience

BUSINESS SYSTEMS ANALYST
- Documenting and specifications
- Maintaining documentation
- Prototyping
- Methodologies
- Tandem equipment helpful
- Project management techniques preferred
- Product evaluation experience preferred

TRAINING COORDINATOR ANALYST
- Schedule user testing and training
- Hotline support
- Status tracking
- Test plan development

Please send resume detailing qualifications and salary requirements to
Showboat Hotel, Casino and Bowling Center, Personnel Office,
Post Office Box 840, Atlantic City, NJ 08404

We offer excellent wages, excellent benefits and an enjoyable family atmosphere.

You do not have to be licensed to apply, however licensure will be required as a condition of employment. Showboat is an equal opportunity employer subject to the rules and regulations of the New Jersey Casino Control Commission. All positions are subject to the approval of the New Jersey Casino Control Commission.

Software Systems Engineer
Design, implement, document maintenance and diagnostic programs for subsystems of object-oriented distribution-transparent operating systems running on capability-based, multiprocessor computer systems using high-level languages such as ADA and advanced software engineering techniques. Master's in Computer Science or Computer Engineering or equiv. $2,650/mo. Job Site Hillsboro OR. Clip this ad and send with resume to Employment Division, Attn: Job Order No. 2120336, 875 Union Street NE, Room 203, Salem, Oregon 97311

Senior Programmer Analysts for life insurance company. Maintain and develop valuation systems and life insurance systems; liaison with actuarial department. Bachelor Degree in Computer Sciences, or scientific field such as Mathematics, Chemistry, Engineering. 3 years experience. Must have reached Level 2 of actuarial exams, or have 2 years experience utilizing actuarial formulas. Experience with Cobol, Assembler, Command Level CICS. $39,000 per year. Job site Los Angeles, California. Please send resumes to Job # SC4148, PO Box 9560, Sacramento, California 95823-0560 not later than June 11, 1987

PROGRAMMER. Extract census data from U.S. Census Bureau corporate tapes using CENSPAC & COBOL for use by budget analysts & agencies. Develop software using PASCAL on an IBM-AT to automate demographic programs in population, labor force & household projection. Develop programs using BASIC to automate yearly budget book production. Modify programs for improved efficiency. Assist budget analysts in using IBM-AT PC. Requires MS in Computer Science Education to include BASIC, COBOL & PASCAL & the use of IBM-AT PC in conjunction with IBM mainframe. Hrs. 8:30AM-5:00PM, 37.5 hrs./wk. $22,000/yr. Central Illinois location. Send resume to: Illinois Dept. of Employment Security, 924 E. Adams, Springfield, IL 62705. Attn: Chuck Mowry. Ref # 012157066. AN EMPLOYER PAID AD

SYSTEMS ANALYST, SR

Four years experience. Bachelor of Science degree with major field of study in Computer Science. Knowledge of manufacturing industry applications and integrated MRP2 and accounting systems required. Duties: Identify and analyze user requirements, design enhancements to existing software packages for worldwide use and manage development team. Job Location/Interview: Glendale, California. Salary: $40,000 per year. Send this ad and your resume/letter stating your qualifications to Job #FC4151, P.O. Box 9560, Sacramento, CA 95823-0560 not later than 6/10/87

COMPUTER POSITIONS AVAILABLE: UNISYS A-10

OPERATIONS MANAGER Supervise 4 employees. Light programming in WFL, REPORTER, COBOL; scheduling; define/implement procedures.

PROGRAMMER ANALYST Minimum 1 year experience in COBOL and database. Telecommunications, ALGOL, REPORTER, college administrative experience a plus.

Both positions require AA, AS, BA/BS degree with salaries to 32K. Send letter and resume by June 17, 1987 to:

Faculty Staff Relations,
SUNY College At Brockport,
Brockport, New York 14420

EOE AA

Programmer Analyst - Analyze, design, develop, implement and maintain industrial applications using DEC PDP11 hardware and UNIX, CP/M, C, BASIC software. High School graduate, 3 years experience. 40 hours per week. $35,000 per year. DOT 012 167 066. Mail resume: NYS Job Service, JO #8011585, 247 W 54th St, 4th Floor, New York, NY 10019

Computer Systems Analyst for Mojave desert laboratory. Design, develop, implement and manage computer systems and instrumentation interface networks for medical laboratory operations, projects and administration. Must have Bachelor's Degree or equivalent education and experience in Systems Analysis or 4 year computer engineering or systems analysis experience in automation operations and on-line systems network applications. Must have knowledge and abilities in microcomputer systems network and multiuser workstation requirements, management information systems and control applications, systems design and implementation, systems operations planning and development, systems maintenance and engineering and laboratory technology and instrumentation applications and requirements. Salary: $40,000/yr. Send resume to Mr. Alam, 44725 10th St. West, #140, Lancaster, CA 93534

SYSTEMS ANALYST: Work on large-scale project for conversion & enhancement of existing systems for Security Trading Co. to eliminate processing against old database system w/programming of same conversion of existing programs to process new & changed databases & to conform to new programming standards; program & system testing, screen redesign & standardization for conversion; amendment & coding of program specification blocks for new & changed databases. 4 yrs exp. or 4 yrs related Analyst/Programmer position. Must know: IBM OS VS COBOL, TSO/ISPF, JCL, IMS VS DB/DC & IBM 30xx. H.S. grad. $40,000/yr. 40 hr wk. Send resume: Pinkerton Computer Consultants, Inc., 20 Broad St., Suite 1302, New York, NY 10005. ATTN: AJ-828

IMS/DBA TPF/ACP

Our firm has 10 IMS DB/DC Data Base Analysts positions in Tulsa and Dallas for persons with 3+ years of development experience and 1 year of design experience.

We are also seeking TPF Systems Communications Coverage, ACP Applications and a TPF Performance Analyst. We also expect some overseas TPF positions opening up soon in England and Europe.

All of these positions offer excellent salaries, benefits, full relocation and other special incentives. If interested in these opportunities, please forward you resume and salary history to:

John Yeager, Inc.
PO Box 471140
Tulsa, OK 74147

FIELD SERVICE ENGINEER. Maintain and install CAD/CAM products including computer graphics systems. Duties include site planning, component level troubleshooting, train lower level field service representatives. Four years experience in Field Service Computer products to include 2 years experience in stalling and maintaining graphics controller disk systems, direct access storage systems, digital graphics systems and plotters required. Travel throughout Indiana servicing clients. $2,250/mo. 40 hr. wk. 8-5. Clip this ad and send with resume and Social Security # to the Indiana State Employment Service, 10N Senate Ave., Indianapolis, IN 46204. Attn: W.F. Shepard. ID No. 3095769. EOE

HOSPITAL INFORMATION SYSTEM MANAGER

UCLA Neuropsychiatric Hospital seeks a highly skilled Computer Resource Manager to assume responsibility for the NPI on-line campus information system (NPHIS), comprised of 6 micro PC supporting over 25 remotely located terminals. Primary focus will be on integrating, maintaining and upgrading the time, clinical and financial modules that constitute the NPHIS. Other responsibilities include budgeting, analytical reporting, resource allocation, user accounting and personnel management.

Required qualifications include:

- *Demonstrated management experience in a complex on-line MIS mainframe environment comprised of multiple CPUs.*
- *Demonstrated knowledge of HP3000 hardware and systems software MPE, including understanding of MIS project management standards. Familiarity with Cerner files software systems desirable.*
- *Working knowledge of hospital and academic administrative system.*
- *Excellent communication, supervisory and interpersonal skill.*

UCLA offers a salary commensurate with experience and an excellent benefits package that includes a variety of tax deferred annuity programs.

Please submit your resume with cover letter and salary history for Job #S-4222 to: **Personnel Director, UCLA Neuropsychiatric Hospital, 760 Westwood Plaza, B7-370 NPI, Los Angeles, CA 90024-1759.** *Affirmative Action Employer*

UCLA
NEUROPSYCHIATRIC HOSPITAL

CONSULTANTS

Advanced Programming Resolutions Inc. a dynamic growth-oriented computer consulting company has Engineering Consulting positions available in Chicago and Columbus and Business Consulting positions available in Columbus.

APR provides you with an excellent salary, comprehensive benefits including major medical, dental, long-term disability and a 401K pension plan and the opportunity for professional growth and development.

Engineering Consultants for Chicago and Columbus requires:

B.S. in Computer Science, M.S. a plus. 1 (yr.) or more work experience in any of the following areas:
*Real time software design and development within a UNIX/C environment
Call processing software design and development
*Switching system requirements and architecture
System integration, system testing, and device drivers
*Operating systems development and local area networks

Business Systems Consultants for Columbus requires:

3-5 yrs. (minimum working experience in any of the following areas:
*IDMS, IMS/DB, ADABAS
*ROSCOE, DATATRIEVE, VSAM, VTAM, OSJCL
COBOL, PL/1, ASSEMBLER, FORTRAN
*MANTIS, NATURAL, ADSO, IDEAL, CICS, IMS/DC
*VAX VMS, DOS/VSE, VM, MVS
*NCR environments including PARADOX

OUR SUCCESS IS OUR PEOPLE!

Please submit your resume to:

Robert D. Williams
Manager of Corporate Recruiting
Advanced Programming Resolutions, Inc.
2715 Tuller Parkway Drive
Dublin, OH 43017
(614) 766-6901

An Equal Opportunity Employer M/F/H/V
UNIX is a trademark of AT&T Bell Laboratories

APR

DATABASE EXPERTS

If you have a minimum of 2 years experience using either IMS DB/DC or IDMS, we have several openings in the Middle Tennessee area. Insurance or manufacturing applications are a definite plus but all industries will be considered. Excellent relocation packages. Companies ready to hire now! High 30's

ROBERT HALF
of Nashville, Inc.
1101 Kermit Dr., Ste. 407
Nashville, TN 37217
615-361-4900

SENIOR RESEARCH ENGINEER

Development of an interactive color pre and post-processor for a finite element program geometry modelling and data base design, drafting and numerically controlled manufacturing packages, and interfaces of above to various graphic devices. CAD/CAM softwares. Salary $31,000 per year, basic 40 hour week (8:30 am - 5:30 pm). Requirements: high school graduate, 6 years college with Master's Degree in Mechanical Engineering, 6 hours course work in Computer Graphics, 3 hours course work in Computer Aided Manufacturing, 3 hours course work in Production Engineering, 3 hours course work in Computer Aided Design, 2 years experience in job offered. Send resume: MESC, 7310 Woodward Ave., Room 415 (Reference No. 27087), Detroit, MI 48202. Employer paid ad.

SALES REP./ FIELD ENGINEER

PCC, a progressive, independent service organization, is seeking Sales Professionals with IBM mainframe/compatible knowledge (or related exp.) to develop/manage accounts, sell D.P. equipment and build maint. business in several locations.

PCC is also looking for a Field Engineer with a minimum of 5 years total experience on the 308X, 3380 and 3350 to provide maint. support for our Los Angeles district.

PCC offers an excellent salary, as well as medical and dental benefits. Qualified applicants should call Rebecca Patterson at (408) 263-3033

COMPUTER PROFESSIONALS

Permanent and contract positions with

- **IDMS, ADS/O**
- **IMS, ADF**
- **SQL, DB-2**
- **NOMAD or FOCUS**

Interested professionals call or send resume to

P A R
Professional Application Resources, Inc.
10907 Rampart
Houston, TX 77096
(713) 729-4129

WHY COMPUTERWORLD IS #1 WITH COMPUTER PROFESSIONALS EVERYWHERE.

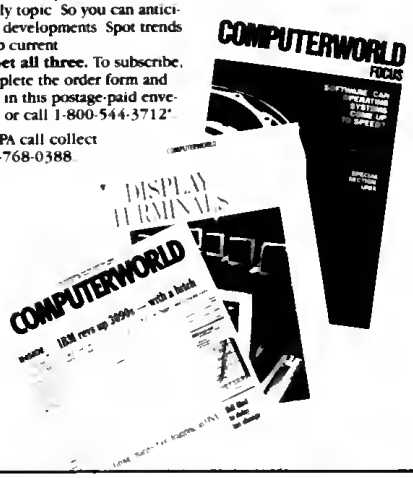
COMPUTERWORLD brings you the latest news Every week So you can keep up or get ahead

SPOTLIGHT, the handy new pull-out section highlights new products — with surveys of key vendors, prices, features, and more So you can make the best buying decisions The most confident recommendations

Plus, Computerworld Focus for in-depth analysis Each monthly issue focuses on a timely topic So you can anticipate developments Spot trends Keep current

Get all three. To subscribe, complete the order form and mail in this postage-paid envelope or call 1-800-544-3712*

* In PA call collect 215-768-0388



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO 55 SOUTHEASTERN, PA 19398

POSTAGE WILL BE PAID BY

CIRCULATION DEPARTMENT

COMPUTERWORLD

P.O. BOX 1016
SOUTHEASTERN, PA 19398-9984

Project Manager Programmer Analysts

The AUXCO Alternative—Opportunities in Orlando, Chicago, Los Angeles and New Jersey

At AUXCO data processing is not merely something we do it defines who and what we are That's why, you may find a move to AUXCO to be an exciting career alternative

An alternative to 'growing stale' working with repetitive applications

An alternative to making frequent job changes to remain at the cutting edge

An alternative to the boredom that comes from always having to solve a different version of the same problem

A career with AUXCO means you'll always be challenged and stretched-visible and recognized

Project Manager—ORLANDO AREA—You should have 2+ years' experience in project management capacity Experience with CICS and COBOL is a must

Programmer Analysts—ORLANDO, LOS ANGELES AND CHICAGO AREAS—You should have 2+ years' experience in the design and programming of on-line CICS/COBOL applications in a business environment A background in CICS/COBOL and OS/MVS operating systems is essential

We also have opportunities in NEW JERSEY AND LOS ANGELES for Unix professionals with experience in one or more of the following UNIX internals with SNA X 25 or IMS OS COBOL/FOCUS "C"/INFORMIX (ESQL) PC DOS and DB2

Send your resume in confidence to AUXTON COMPUTER ENTERPRISES INC , Dept CW-525, 851 Trafalgar Crt , Maitland FL 32751 An equal opportunity employer

AUXCO

SYSTEMS ENGINEER

Major data processing services company is seeking a professional to model, design, construct and implement automotive manufacturing computer software for a new approach to automotive production involving high integration of advanced technology, electronic business systems and human resources.

All data modelling will be done using ERA (extended relational analysis) methodology, computer systems design will be premised on an integrated, fully relational database, with systems construction constrained by formal SDLC (systems development life cycle) procedures. Other duties entail directing a project team through the various phases of the above design construction activites to comply with all requirements of the SDLC.

Required qualifications include a Bachelor's degree with a field of study in Industrial Engineering, Mechanical Engineering or Computer Science, 4 years of experience as Industrial Engineer and 4 years as Programmer/Analyst. The 4 years in Industrial Engineering must include experience in automotive manufacturing processes to enable deriving a valid data model from the customer analysis sessions, of the 4 years as Programmer/Analyst, 3 on large IBM mainframes including PL1 or COBOL, CICS, MVS or DOS operating system, VSAM file access plus 1 year mainframe, on-line system design experience within the environment of a fully relational data base architecture Must be able to relocate to outstate plant site one year after employment.

The minimum working hours are 40 hours per week, with a starting salary of $39,000 annually

Please send your resume in confidence to: Michigan Employment Security Commission, 7310 Woodward Avenue, Room 415, Detroit, Michigan 48202, Reference # 25987" Ad paid for by employer.

An Equal Opportunity Employer, M/F

NEW YORK, NEW JERSEY
NEW ENGLAND
PROG'RS
PERMANENT
AND/OR CONSULTANTS

IMMEDIATE OPENINGS

—IBM—
- Systems Prog'rs MVS IMS DB/DC
- COBOL Prog'rs—all levels

—DEC—
- Prog Mgr VAX INGRES C
- Prog'r VAX INGRES C

—HONEYWELL—
- Database Administrator DMIV

Please call 212-684-6314
or submit resumes to:
Mr Dewey Raymond,
HANK WALSH ASSOCIATES
475 Fifth Av., NY, NY 10017

COMPUTER PROGRAMMER Candidate must review specifications programs to assure clarity completeness and accuracy develop flow charts to establish logic of execution in accordance with efficiency demanded by production write programs to control programs in hardware and modify current programs to utilize advanced techniques and incorporate changes in manufacturing processes write operating instructions initiate and supervise debugging produce documentation after completion of debugging supervise technicians in systems operation and assist junior programmers initiate changes in software techniques or systems utilization based on knowledge of current changes in data processing techniques changes in technology or production and work with and user to assure efficient implementation of programs and program changes BS degree in Computer Science 2 years programming experience utilizing IBM Series 4,000 computer knowledge of COBOL CICS Command level and JCL is required Salary $25 324 per year Resume to H Block Job Service 16 South Ave Rochester NY 14604

ACF2 & ASM2 Sales Support Representatives

Why work for *a* leader, when you can work for *the* leader?

We're a leading software company committed to having the best of everything The best products The best service. And the finest people

You can join our **Systems Software Division** as a **Sales Support Representative** in either our **Atlanta, Boston, Chicago, Dallas, Los Angeles, New York, San Francisco, or Washington DC** offices and make a valuable impact in support of our **ACF2** or **ASM2** MVS Software Packages

ACF2

Requirements for these positions include

- 1–2 years systems programming experience previous ACF2 installation experience preferred
- 1+ year ACF2 administrator experience with implementation involvement including policy formulation in the areas of installation options user interface/training security packages etc
- Thorough knowledge of ACF2 and EDP auditing experience

ASM2

Requirements for these positions include

- 2 years previous systems programming experience
- 2 years DASD management experience with ASM2 preferred
- Operations experience a plus

In both areas, you will be responsible for

- Making pre-sales technical and product presentations
- Client and sales training
- Advising clients with system installation and implementation
- Minimum 50% regional travel

In addition to the above requirements, you should have

- College degree in a related area
- Strong communications and presentation skills
- Solid background in systems and operations preferably in a management capacity

Influence the future with UCCEL and earn one of the finest compensation packages in any industry With our UCCELECT benefits plan you have the option to choose the coverage that best suits your needs More progressive thinking from UCCEL

For immediate consideration please submit your résumé along with salary history and location preference (relocation assistance will be provided) to

UCCEL Corporation
UCCEL Tower
6303 Forest Park
P.O. Box 660054
Dallas, TX 75266
Attn: Sue Ratcliff

An Equal Opportunity Employer M/F

UCCEL

Where it pays to excel

Software Cobb & Bryant Inc

- **Analysts Programmers**
- **Database Administrators**
- **System Programmer**
- **DB2 Instructor**
- **DDA Banking Applications**

MANAGER INFORMATION SYSTEMS

General Nutrition Products located in Greenville SC has an immediate opening for an Information Systems Manager To qualify for this position candidate should possess 1) Bachelor's degree in Management Information Systems Data Processing Computer Science or a related field 2) 7 years experience in design development and implementation of information systems in a manufacturing environment Minimum 2 years experience managing data processing professionals 3) Overall knowledge of IBM mini and mainframe systems utilizing IBM Systems 36 & 38 4) Working knowledge of MARCS and RPG If you have a demonstrated ability to organize and manage projects and can function effectively with management at both the division and corporate levels we would like to discuss this position with you General Nutrition Products is an equal opportunity employer and offers a competitive wage and benefits package Please send resume and salary history to **Personnel Manager General Nutrition Products, 1050 Woodruff Rd., Greenville, SC 29607**

HOW MARKETABLE ARE YOU?

Sr Sys Analyst 9-11 yrs exp Reqs design & CICS Will train in DB2 Co ranks among N C s highest paying To $48M

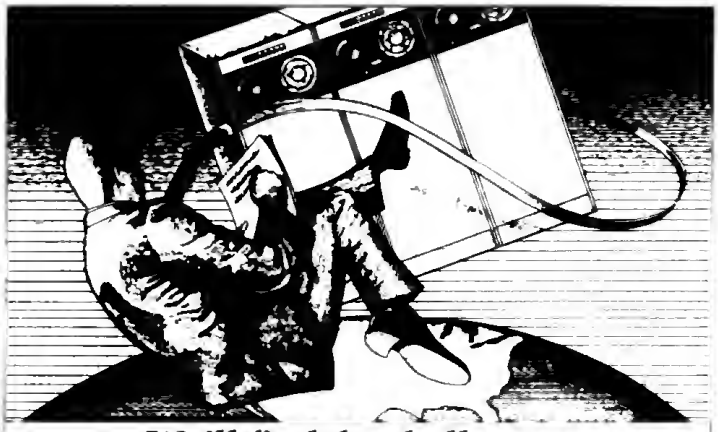
Prog Analyst 3-5 yrs exp (COBOL CICS & mfg appl W train in IMS R E lies closing costs dental To $39 5M

Sr Sys Prog 7-8 yrs exp with MVS or CICS Gens Tuning Co ranks as best managed in Southeast To $45M

Sr Sys Analyst 9-11 yrs exp CICS & Pharmaceutical background Join the world's fastest-growing drug co To $50M

If you are sincere about a career move which will be in your best interest exclusively contact an agency that is an established member of a nationwide network and will give your career interest top priority **Please call Robert Montgomery collect at 919-787-4205 or send resume to**

The Data Group
P.O. Box 52055
Raleigh, NC 27612



We'll find the challenge. And the challengers.

CompuSearch provides the synergy that brings the right candidate together with the right job. CompuSearch Account Executives are data processing professionals in their own right. They've worked in the industry. They're active in trade organizations. They are in touch with the changes that make this field move.

So whether you're in search of a challenge, or for someone to accept your challenge, CompuSearch is where to look first.

CompuSearch®
A DIVISION OF MANAGEMENT RECRUITERS

We find the challenge. And the challengers.

S.E. LOCATIONS

ARE YOU READY FOR A CHANGE?

If you are sincere about a career move, you will best be served by exclusively contacting a well established recruiter. We will give your career goals top priority in a confidential and professional manner.

P/A S/A, COBOL, CICS, IDMS, MRP	29-35K
PROJ LDR, IMS DB/DC, MRP-A/PCS	36-42K
P/A COBOL, CICS, IMS	24-35K
P/A S/A-P/L, SYS 38, APICS/CPIM	29-40K
SYS PROG MVS/XA	33-44K
SYS PROG IMS or CICS	38-52K
DBA IMS or IDMS	37-48K
P/L, COBOL, CICS, IDMS, MRPII	39-46K
EDP AUDIT/MAINFRAME	32-44K

CHARLES MENKEL 704-372-7290

SP ASSOCIATES, INC.
P.O. Box 31335
Charlotte, NC 28231

Project Director - Software Integration

Bachelor's Degree in Computer Science, Mathematics, Accounting or Engineering, with four years computer software design and development experience. Requires thorough understanding of U.S. federal tax law (including 1986 tax reform provisions), understanding of basic principles of financial planning, including estate planning, retirement planning and education planning, thorough familiarity with ISAM data base systems, knowledge of PL/I-86 and Fortran software languages, operating knowledge of Convergent Technologies microcomputer and IBM 370 Series hardware, operating knowledge of IFS, Rosing Point, IFS Report Controller, IFS Forms and Micro-Mae development tools. Direct project integrating financial planning and financial management software with tax processing software. Salary $40,000 per year. Apply with resume to Georgia Department of Labor, 2811 Lakewood Avenue S.W., Atlanta, Georgia 30312, or to the nearest Georgia Job Service Center. Control # GA 5211276

SR. MGR. $50K+

ATLANTA client requires
- Undergraduate Degree
- Big 8 Experience
- Current Tech. Ability S/38
- & Oral And Written Communications Expertise

To confirm the opportunity that will be afforded you if you have the above prerequisites, please contact Richard Kemmerly

2720 Stemmons Freeway 1207C
Dallas, TX 75207 (214) 637-6360

DATA PROCESSING CAREERS, INC.

DATA PROCESSING QUALITY ASSURANCE SPECIALIST

Opening for a Quality Assurance Specialist responsible for management, planning and interpretation of large and lengthy software testing projects with specialization in accounting functions and cycles such as accounts payable, general ledger, purchasing, inventory, and budgetary control. Must have a B.S. degree in Business, Commerce or Computer Science with two years of experience in the on-site support of an automated data processing system. This support must include the implementation, use and testing of automated accounting functions in a business environment. Salary $31,000/yr. 40 hrs. M-F. Applicants apply in person with resume or send resume to Georgia Department of Labor, 2811 Lakewood Avenue, S.W., Atlanta, Georgia 30315 or to the nearest Georgia Job Service Center. Control No. GA 5220199

An equal opportunity employer

SOFTWARE SERVICES

The Industry Leader

A subsidiary of DURRETTON INTERNATIONAL INC

- COBOL, CICS
- COBOL, IDS II
- RPG II & RPG III
- COBOL, IMS DB/DC
- UNIX, C, ASSEMBLER
- IDMS • MODEL 204
- D BASE III, LOTUS 1-2-3

Paid education, excellent benefits and salary commensurate with experience

Call toll-free National 1-800-237-8181 Florida only 1-800-282-4141

or send resume to Cy Dougherty, Personnel Director
Paragon Crossing, Suite 124, 11300 4th St. N., St. Petersburg, FL 33702

HP 3000 PROFESSIONALS

PROJECT LEADERS, PROGRAMMER ANALYSTS and SYSTEMS ANALYSTS

Positions require from 2-5 years of programming experience with at least 2 years HP 3000 including IMAGE, VPLUS and KSAM. A working knowledge of TRANSACT will be an added plus, though not required. Excellent technical environment including Networking, laser printing, X.25, PC's, etc.

COMPUTER OPERATIONS MANAGER

Must have at least 3 years of proven track record in managing HP 3000 equipment and operations staff. Duties include control of HP 3000 configurations including laser printing, X.25, data switches and PC's plus supervision of production schedules, tape library and inventory control. A challenging and dynamic position.

ETC provides excellent growth opportunities with comprehensive company paid benefits. Send resume to:

ETC

Director, Corporate Recruiting
ENVIRONMENTAL TESTING & CERTIFICATION CORP.
284 Raritan Center Parkway
P.O. Box 7808
Edison, N.J. 08818-7808
Equal Opportunity Employer

ENGR. CAD S/W. Engr. resp. in CAE/CAD system management including maintenance implementation of programs for h/w design and development applications in C & Pascal. Min MS or equiv. EE or CE or BSEE or CE & 2 yrs. exp. CAD S/W Engr. with CAE/CAD system mgt exp. Applicants must have backgrd in CAD for VLSI, CAE tools environment (including schematic entry, simulation, components library mgt), knowledge of UNIX & VMS o/s & C, Pascal. $2583/month. Job Site/Inter. Cupertino, CA. 40 hrs/wk. Applicants clip ad and send resume to Job #DN 4879, PO Box 9560, Sacramento, CA 95823-0560 by June 9, 1987. EOE

COMPUTERWORLD CLASSIFIEDS--

--PROGRAMMED TO HELP YOU

The computer industry is dedicated to developing greater efficiency and valuable time-saving resources for the business world.

Well, so are ***Computerworld Classifieds.***

And we can deal with a lot of problems. Our classifications include:

Employment Today – To help you find the computer professionals right for you.

Positions Wanted – For individuals seeking full-time, permanent positions - no company ads are allowed.

Buy, Sell, Swap – For those seeking to buy, sell or lease computer equipment.

Time & Services – For companies who want to offer computer timesharing or other computer-related services.

Software & Software Wanted – Used for buying & selling software packages.

Business Opportunities – For those seeking individuals or partners in computer-related business ventures, mergers, or franchises.

Real Estate – For those seeking to sell or lease office space suitable for computer rooms or computerized businesses.

Bids & Proposals – Used to request for bids on equipment or to invite proposals for desired computer acquisitions.

The open line rate is $12.60 per line and there is a minimum size ad of 2 column inches (28 lines) at a cost of $352.80. Depth increases in half-inch increments and we accomodate up to 5 columns.

If you wish a box number to be assigned to your ad, it will cost an additional $15.00.

If you wish to reserve space, or would like more information, call us at **1-800-343-6474** or (in Mass.) **617-879-0700**. All materials should be sent to:

COMPUTERWORLD Classifieds
Box 9171
Framingham, MA
01701-9171

CTG & S.E.

Put your expertise to work for you with CTG, a 21 year old software consulting firm with over 47 offices nationwide and revenues in excess of $150 million

We currently have positions available in our **Birmingham, Chattanooga, Memphis** and **Nashville** offices for **PROGRAMMER ANALYSTS** and **SYSTEMS ANALYSTS** with 2+ years experience in any of the following areas

- **CICS**
- **IMS DB/DC**
- **IDMS/ADSO**
- **BAL/ALC**
- **BURROUGHS**
- **VAX/COBOL**
- **DB2/SQL**

In order to attract and retain superior individuals, CTG provides its employees with a unique development program, which involves formal training, challenging assignments and an excellent salary and benefits package

To find out more about career opportunities with CTG, CALL or RUSH your resume to **COMPUTER TASK GROUP, 215 Centerview Dr., Ste. 125, Brentwood, TN 37027, (615) 373-0794.** Equal Opportunity Employer

CTG

MARICOPA COUNTY
Phoenix, Arizona

Operations Quality Assurance Manager

Starting at $35,277 Annually

Maricopa County Department of Technology and Information Systems seeks a highly qualified and experienced Operations Quality Assurance Manager to develop standards, measurements, training and reporting necessary to implement a quality assurance program for operational activities during a period of major change in growth. Will consist of system testing and implementation of applications, software networks and major hardware subsystems, functional and physical configuration auditing and reporting, audits of libraries for compliance with standards, security and management of resources, monitors change control program, problem reporting program and network problem management program for compliance with standards and effectiveness. Position Requirements: a Bachelor's Degree in Business or Computer/Information Science or related field and 2 years specific experience in EDP quality assurance for a large organization or 2 years experience performing data processing management audits for a large accounting or management consulting firm, and 4 years general experience covering system analysis and programming or technical services or operations management. The ideal candidate will possess a comprehensive knowledge of electronic DP processing quality assurance program methodologies, tools, measurement techniques and standards. The candidate will also possess considerable knowledge and skill in project management methodologies, file and transaction security software

Maricopa County provides an outstanding living environment, competitive salary and professional challenge worthy of the best

To obtain a County application call the Maricopa County Personnel Office at 602/262-3755. For confidential consideration a County application and resume must be received by June 12, 1987

Note: In compliance with Arizona Revised Statute 35-196-01, Maricopa County cannot pay traveling or lodging expenses for out-of-state candidates invited to appear in Phoenix for interviews, or moving expense if hired

An Equal Opportunity Employer

RURAL MISSOURI

IDMS ADS/O shop in a peaceful Ozark setting is looking for an experienced (3+ years) Programmer Analyst to design, develop and maintain their manufacturing and accounting systems. Will program in OS COBOL and use CICS and TSO. Very good benefits and relocation

ROBERT HALF
Data Processing
7733 Forsyth Blvd.
St. Louis, MO 63105
314-727-1535

Unlock the secrets to EDP Career Growth with NCA's winning combination.

The secret of impressive career growth is based on a combination of knowledge and experience. 1 A thorough knowledge of all the career opportunities available to you. 2 Inside information about the companies offering those opportunities. 3 The long-established respect of those employers. 4 And the experience and skill required to favorably negotiate your terms of new employment

NCA offers you that winning combination, and much more. Come in. Call. Or mail your resume to the NCA firm nearest to you

ATLANTA: DataPro Personnel Consultants, 400 Perimeter Center Terrace, Suite 850, Atlanta, GA 30346 (404) 392-4242
BALTIMORE: CPS Inc, 1107 Kenilworth Drive, Suite 208, Towson, MD 21204 (301) 296-8420
BOSTON: Robert Kleven & Co., Inc, P.O. Box 638, Lexington, MA 02173 (617) 861-1020
CHICAGO: Thomas Hertz & Associates, 550 North Wacker Drive, Suite 1790, Chicago, IL 60606 (312) 977-1555
CINCINNATI: Tash Group, 7875 Reading Road, Cincinnati, OH 45237 (513) 821-8275
CLEVELAND: Innovative Resources, Inc, Statler Office Tower, Suite 426, East 12th & Euclid, Cleveland, OH 44115 (216) 621-4220
COLUMBUS: Michael Thomas, Inc, 455 W. Wilson Bridge Road, Suite 340, Worthington, OH 43085 (614) 846-0926
DALLAS: DataPro Personnel Consultants, Inc, 12720 Hillcrest, Suite 520, Dallas, TX 75230 (214) 661-8600
DENVER: Abacus Consultants, Inc, 1777 South Harrison Street, Suite 404, Denver, CO 80210 (303) 759-5064
DETROIT: Electronic Systems Personnel, 3000 Town Center, Suite 2580, Southfield, MI 48075 (313) 353-5580
GREENSBORO: DataMasters, P.O. Box 14540, Greensboro, NC 27415-4540, (919) 373-1461
HARTFORD: Compass Incorporated, 900 Asylum Avenue, Hartford, CT 06105 (203) 549-4240
HOUSTON: Carter Consultants, Inc, 7880 Post Oak Boulevard, Suite 1050, Houston, TX 77056 (713) 626-4100
KANSAS CITY: DP Career Associates, 6405 Metcalf, Suite 502, Shawnee Mission, KS 66202 (913) 236-8788
LOS ANGELES: Superior Resources, Inc, 22653 Pacific Coast Highway, Suite 1 108, Malibu, CA 90265 (818) 884-3000
MIAMI: Data Sciences Personnel, Inc, P.O. Box 8677, Hollywood, FL 33024 (305) 434-6117
MILWAUKEE: EDP Consultants, Inc, Chancellory Park II, Suite 350, 350 N. Sunnyslope Road, Brookfield, WI 53005 (414) 797-8855
MINNEAPOLIS/ST. PAUL: Electronic Systems Personnel, 800 International Center, 900 2nd Avenue South, Minneapolis, MN 55402 (612) 338-6714
NEW JERSEY: Systems Search, 90 Millburn Avenue, P.O. Box 751, Millburn, NJ 07041 (201) 761-4400
NEW YORK: Rolor Associates, Inc, 7 Dey Street, Suite 410, New York, NY 10007 (212) 227-7370
PHILADELPHIA: Systems Personnel, Inc, 115 West State Street, Media, PA 19063 (215) 565-8880
PHOENIX: Professional Career Consultants, 4725 North Scottsdale Road, Suite 208, Scottsdale, AZ 85251 (602) 274-8888
ROCHESTER: Traynor Confidential Ltd, 10 Gibbs Street, Suite 400, Rochester, NY 14604 (716) 325-6610
SAN DIEGO: Technical Directions Inc, 1000 Texas Street, Suite 301, San Diego, CA 92108 (619) 297-5611
SAN FRANCISCO: The Computer Resources Group Inc, 303 Sacramento Street, San Francisco, CA 94111 (415) 398-3535
SEATTLE: Houser, Martin, Morris & Assoc, 1940 116th Avenue NE, Box C-90015, Bellevue, WA 98004 (206) 453-2700
SYRACUSE: CFA Associates Personnel Inc, 5700 Widewaters Parkway, Dewitt, NY 13214 (315) 446-8402
WASHINGTON DC: Bill Young & Associates, 8322 Professional Hill Drive, Fairfax, VA 22031 (703) 573-0200
AUSTRALIA: Sabre Consulting Group Pty Ltd, 37 Albert Road, Melbourne, Victoria, Australia 3004 (03) 820-1085

National Computer Associates

Stay Where You Are Unless...

...you're ready to excel with a company dedicated to creating computer technology's leading edge. Floating Point Systems superior lines of scientific computers and processors are in continual demand by scientific and engineering specialists in many diverse fields, *and the time is right for you to join our talented team!*

We have immediate opportunities for professionals with the expertise to excel in the following visible positions:

SENIOR OPERATING SYSTEMS ENGINEERS
Specification, design, implementation and checkout of operating systems software for new product development. Requires strong UNIX internals experience; UNIX porting experience a plus. Appropriate degree, or equivalent

SENIOR SYSTEMS VERIFICATION ENGINEERS
Software diagnostics, simulation, and systems verification and performance estimates and measurements. Prefer UNIX and requires "C" experience. Appropriate degree, or equivalent.

SENIOR DESIGN AUTOMATION ENGINEERS
Design and develop simulation models for complex components and computer systems architecture. Requires knowledge of computer architecture and industry experience in "C" and/or Pascal, as well as work station environment. BSEE or BSCS, or equivalent

APPLICATIONS DEVELOPMENT ENGINEERS
Design and implement scientific/engineering applications software. Requires ability and interest in assembly and FORTRAN languages. BS in CS and/or Math, or equivalent

SENIOR MECHANICAL ENGINEER
Specification, evaluation and design of computer systems package. Requires relevant design and analysis (via computer tools) experience. BSME, or equivalent.

The excitement, challenge and rewards you seek are at FPS today! In addition, you'll enjoy the famed beauty and quality of life in the majestic Pacific Northwest. For prompt consideration, send your resume in confidence to **FLOATING POINT SYSTEMS, INC., Attention: Bob Clay, PO Box 23489 CW-02, Portland, OR 97223. For questions, call (800) 547-5627.** Principals only. Equal opportunity employer

FPS FLOATING POINT SYSTEMS, INC.

Senior Data Center Analyst

A Midwestern manufacturer and world leader in the design and assembly of military government vehicles has an immediate opening for a senior data center analyst

Responsibilities include installing and maintaining operating systems, communications software and related programming in an IBM mainframe environment. You may also become involved in developing interfaces, troubleshooting and writing user documentation

You need a 4-year degree in computer science or a related discipline, or equivalent experience, 2 years experience as a systems programmer in an MVS/JES2 environment, and knowledge of SMP/E. Skills in the following are preferred: VTAM, NCP, CICS, IMS/DB

We can offer a highly competitive salary and benefits package. Submit your resume and salary history in confidence to

CW-B4919,
Computerworld, Box 9171,
Framingham, MA 01701

Equal opportunity employer

DP PROFESSIONALS

Cutler/Williams is a National Information Management Services Company with regional offices in Dallas, Detroit, Chicago and Cleveland

In addition to an excellent benefits package, Cutler/Williams offers challenging assignments in environments utilizing the latest hardware, databases and productivity tools available

For consideration of employment, candidates should possess 3 to 5 years experience in one or more of the following hardware/software environments

- **IBM mainframes-OS/MVS COBOL, PL/1, IMS DB/DC, CICS, DL/1, TSO/SPF, ADF, TELON, FOCUS, ADABAS/NATURAL, RACF, ACF2, MARK IV, DB2, SQL**

Experience with Yourdon or other structured methodology, MSA, Hogan, McCormick and Dodge, UCCEL software packages. Banking, Financial Systems, or Utility Company exposure would be additionally desirable

For consideration call 800/527-4907 (in Texas call 214/960-7053) or send your resume in confidence to:

Corporate Recruiting
Cutler/Williams Incorporated
4000 McEwen South, Suite 200
Dallas, Texas 75244

CUTLER/WILLIAMS
Information Management Services

EEO-M/F/H/V

Manager of Computing Facilities and Services

The Division of Applied Sciences seeks a qualified individual to manage the Division's central computer facility and other systems distributed throughout the Division. Will oversee a staff providing time sharing and word processing services, laser printing support, electronic mail, operating system support, and maintenance of a software inventory. Will advise users regarding hardware and software purchases, administrative programming and database support and user support. Requirements include a Bachelor's degree and at least 5 years of experience with a variety of computer systems, significant UNIX operating system experience and exposure to local area networking and broad software and hardware background as well as previous managerial experience

Qualified candidates should send resumes to Dr. Peter S. McKinney, Harvard University, Division of Applied Sciences, 216 Pierce Hall, Cambridge, MA 02138

An Affirmative Action/Equal Opportunity Employer

HARVARD UNIVERSITY

In Step

For the Future!

Reebok is America's fastest growing athletic footwear company. Currently, in an IBM start-up environment, we have a number of new positions to join our MIS group. These opportunities are at all levels for individuals with batch, and on-line experience in an MVS/XA, CICS, and data base environment (IDMS or DB 2 preferred). Apply your experience in developing business systems in the following areas: Finance, Inventory Control, Imports, Marketing, Sales and Allocation/Distribution.

If you have the experience, the drive and desire to contribute to our growth, we invite you to join us in one of the following positions.

APPLICATIONS DEVELOPMENT
Project Leaders
Programmer/Analysts
Programmers

DATABASE SUPPORT
Database Manager
Database Specialists

If you are an experienced MIS professional with excellent communication skills who can think conceptually, put yourself in the running by submitting your resume with salary requirements to

Human Resources Dept., Box D-1
Reebok International Ltd.
81 Wales Avenue
Avon, MA 02322

Equal Opportunity Employer

Reebok®

Because life is not a spectator sport.™

TIME, SERVICES & SOFTWARE

How to increase your power without paying the price.

Turn to Manufacturers Hanover Data Services Corporation for low-cost, state-of-the-art timesharing and Information Center services.

- Secure environment
- Software includes MVS/SP, VM/SP, VM/XA, TSO, GDDM, CMS, and Presentation Graphics Equipment
- Processing done on IBM 3084, MX1 and IBM 4381 systems
- Accessible via many tele communications methods
- Volume discounts

For more information write
Jeff Daum
Manufacturers Hanover Data Services Corporation
PO Box 26
Carlstadt, New Jersey 07072
Or call (201) 896-2030

MANUFACTURERS HANOVER

IBM is a trademark of International Business Machines Corporation
© 1987 Manufacturers Hanover Trust

COMPUTING SERVICES

CPU 1	CPU 2
MVS/XA	VM/370
CICS	DOS/VSE
IMS	CICS
TSO	CMS

- ** IBM HARDWARE
- ** FULL TECHNICAL SUPPORT
- ** FOURTH GENERATION LANGUAGES
- ** NATIONWIDE ACCESS
- ** GUARANTEED RESPONSE AND AVAILABILITY
- ** FULL DISASTER RECOVERY BACKUP
- ** ON SITE CUSTOMER AREA
- ** FULL SECURITY
- ** VOLUME AND TERM DISCOUNTS

For more information please contact

BURNS COMPUTING SERVICES, INC.
10 Gould Center
Rolling Meadows, IL 60008
Midwestern Sales (312) 981-5200
Eastern Sales (212) 432-1151 • (215) 388-3600

COMPUTER TIMESHARING

- We broker computer time
- All mainframes
- Nationwide Service
- NEVER a charge to the Buyer
- Our fees paid by the Seller

Call Don Seiden at
Computer Reserves, Inc.
(201) 688-6100

VAX TIME

- 8600, 785 and 780 Computers
- Rates from $5.00/Hour
- Timeshared or Dedicated
- Tymnet Access Available
- Hotsite Backup Services

CONTACT KEN CHARLTON
(800) 426-5890 Outside Calif
(800) 345 2265 Calif Only

MOTECH

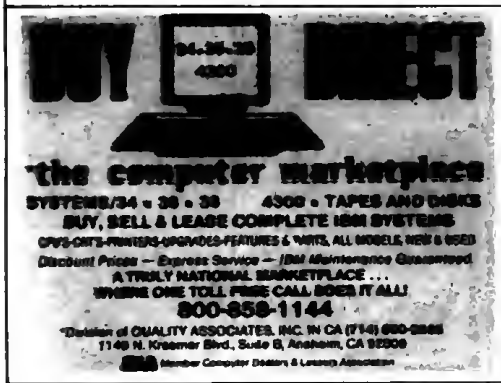
Innovative Computer Techniques

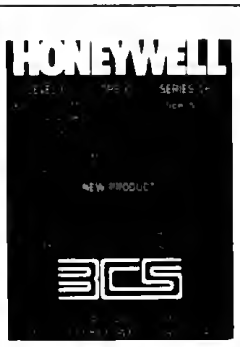
COMPUTER SERVICES
IBM 3081 DEC 10
VAX 8600

- Batch Processing
- Timesharing
- Public Network Access
- Laser Printing

Route 202, Raritan, N.J. 08869
201-685-3400. Contact: Joyce Bagarella

BUY SELL SWAP





DEC
BUY SELL
TRADE LEASE
NEW/USED
SYSTEMS PERIPHERALS
Time Electronics, Inc
MA 617 342-4210
OH 614-764-2224
DEC is a Registered Trademark of Digital Equipment Corp

• Buy • Sell • Lease • Rent
IBM. Displaywriters
5525 — OFFICE SYSTEMS
5219 — 5253 — 5258
6670 PRINTERS
SYSTEM/34/36
CDB FINANCIAL INC
3520 DILIDO ROAD
DALLAS, TEXAS 75228
214 324-3491

MASSCOMP Computer Sale
50-60% Off List
35 New And Used MC 68010 And MC 68020 Based 32-Bit Unix Computers, Masscomp Models 5400 And 5500. For Sale By System Integrator As Excess Inventory
Contact A. Santucci
(203) 282-1478

3704 3705 3725
BUY • SELL • LEASE
Call Toll Free
800 532 7532
Minnesota Call 612-927-1141
Centron DPL Company
Minneapolis, MN

DEC
8650-CDAP
Fully Refurbished By DEC*
Lot 8528 X
Comes with VMS 4.5 and Decnet
Includes 90 day warranty
Along with factory installation
Ready to ship
CALL FOR SPECIAL PRICING
Time Electronics, Inc.
MA 617-342-4210
OH 614-764-2224
* DEC is a Registered Trademark of Digital Equipment Corp

1-800-426-USED

(714) 641-3366

IF IBM MAKES IT, WE CAN SAVE YOU MONEY

Series/1
System/34
System/36
System/38
43 XX
30 XX

- Top Savings
- Quick Delivery
- Short and Long-Term Leases
- All Models & Peripherals
- New & Used

MI&A

Marshall Lewis

& Associates, Inc.

CDLA Member Computer Dealers & Lessors Association

1536 Brookhollow Drive, Building A
Santa Ana, Ca 92705-5426

When

WHEN SHOULD YOU LEASE?
WHEN SHOULD YOU BUY?
WHEN SHOULD YOU SELL?
WHEN SHOULD YOU TRADE?
WHEN SHOULD YOU UPGRADE?

WHEN YOU WANT ANSWERS, CALL US

WE BUY · SELL · LEASE
34 · 36 · 38 · SERIES 1 · 4331-4381
ALL PERIPHERAL EQUIPMENT
ALL UPGRADES

CALL: 800-238-6405
IN TN: 901-372-2622
IN NC: 919-884-0879

CB

COMPUTER BROKERS INC
2978 SHELBY ST
MEMPHIS, TN 38134
"SINCE 1974"

asa

NEED MORE MIPS?

Call 800-243-5307

MAY 1987

Copyright 1987 Randolph Computer Corporation

IBM

SYSTEMS	MIPS (Millions of Instructions Processed Per Second)	MEGABYTES
#9373-20	0.3	4 to 16
#9375-40	0.3	8 to 16
4331-2	0.50	1 to 4
S/36-300	0.58	6 to 8
S/36-400	0.75	6 to 8
#9375-60	0.76	8 to 16
4341-1	0.98	2 to 4
S/36-500	0.98	8 to 16
S/36-700	1.1	16 to 32
4381-11	1.4	4 to 16
4381-5	1.45	2 to 12
4341-2	1.5	2 to 16
#9377-90	1.8	8 to 16
4341-12	1.88	2 to 16
4381-1	2.1	4 to 16
4381-2	2.7	4 to 32
4381-12	2.7	8 to 32
4381-13	3.8	8 to 32
3083EX	4.4	8 to [illegible]

SYSTEMS	MIPS (Millions of Instructions Processed Per Second)	MEGABYTES
4381-3	4.8	8 to 32
3033UP	5.0	4 to 24
4381-14	6.0	[illegible] to 32
308X[illegible]	[illegible]	[illegible] to 2
308X[illegible]	[illegible]	8 to 32
3090-[illegible]	9.3	32 to 64
3081D	10.0	16 to 32
3090-[illegible]	9[illegible].0	32 to 64
308[illegible]X	1[illegible]	16 to 64
309[illegible]	1[illegible].4	32 to 64
308[illegible]X	1[illegible]	16 to 64
309[illegible]	1[illegible]	32 to 64
3280-20[illegible]	27.7	64 to 128
308[illegible]X	28.7	32 to 128
3090[illegible]	31.6	64 to 128
3090-3[illegible]	44.3	64 to 128
3280-400	50.0	128 to 256
3090-400E	58.0	128 to 256
3090-600E	76.0	128 to 256

• First Installation 1987

AMDAHL

SYSTEMS	MIPS	MEGABYTES
5840	8.4	16 to [illegible]
5850	[illegible]	[illegible] to 128
5860	[illegible]	[illegible] to 128
5867	22.8	24 to 128
5868	32.0	32 to 256
5870	[illegible]	32 to 128
5880	[illegible]	32 to 256
#5890-190E	25	64 to 256
#5890-200E	31	64 to 256
#5890-300E	40	64 to 256
#5890-400E	58	128 to 512
#5890-600E	87	128 to 512

NATIONAL ADVANCED SYSTEMS

SYSTEMS	MIPS	MEGABYTES
AS 9060	11	16 to 64
ASXL 50	15	32 to 64
AS 9070	16	16 to 64
AS 9080	20	16 to 64
AS XL 60	25	64 to 256
AS XL 80	50	64 to 256
#AS XL 90	67	128 to 512
#AS XL 100	80	128 to 512

The above information is intended as a guideline for computer users on relative computer systems instruction cycle times. All data have been derived from published documentation and represent reasonable estimates of average MIPS ratings. However, Randolph is not responsible for the accuracy of the MIPS data. Cycle times will vary based on hardware software configurations and system manufacturers continually modify computer models as design improvements in hardware and software arise.

TALK TO RANDOLPH NOW. Whatever your computer system needs, Randolph can deliver the hardware when you need it and ease the pressure on your DP budget with low lease rates. Call 800-243-5307 in CT (203) 661-4200

Randolph

CDLA

Randolph Computer Corporation
Subsidiary of Bank of Boston · 537 Steamboat Road, Greenwich, CT 06830

IBM BUY · SELL · LEASE

36 · 38 · 4300 · SERIES 1

- Processors
- Peripherals
- Upgrades

IE THE SES

(714) 847-8486

IBM 4300 SYSTEM 36 SYSTEM 38 SERIES 1

SPECIAL All S/1 4956 XBCPU's — All S/36 8 Models & Upgrades

• Buy • Sell • Lease • Trade • New • Used

• Equipment Configured To Your Requirements • All CPU Upgrades

• Flexible Lease Options • Tailored to Your Needs • Purchase Plans

CDLA

714/770-2122

IBM SPECIALISTS

SELL • LEASE • BUY

S/34 S/36 S/38
1741 1742

- New and Used
- All Peripherals
- Upgrades and Features
- IBM Maintenance Guarantee
- Immediate Delivery
- Completely Refurbished

800-251-2670
IN TENNESSEE [illegible]

CMA
COMPUTER MARKETING

P.O. BOX 71 • MORRISON STREET • COLLEGE GROVE, TENNESSEE 37046

IBM ... 34 36 38 4300

TAPES
DISKS
TERMINALS
PRINTERS

800 258-2233

MISSISSIPPI CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 301 N. Lamar St., 301 Building, Suite 508, Jackson, MS 39201 for the following equipment and services:

Request for Proposal No. 1221, due Monday, June 8, 1987 at 3:30 p.m. for the acquisition of a turnkey microcomputer-based Pharmacy system for EAST MISSISSIPPI STATE HOSPITAL and NORTH MISSISSIPPI RETARDATION CENTER. No charge.

Request for Proposal No. 1222, due Monday, June 8, 1987 at 3:30 p.m. for the acquisition of an IBM System/36-based fund accounting package for the STATE DEPARTMENT OF TREASURY. Charge $10.00.

Detailed specifications may be obtained free of charge from the CDPA office or at the specified cost by submitting a written request accompanied by the appropriate payment. **NOTE: Valid forms of payment are corporate check on a Mississippi bank, certified check or POSTAL money order. NO CASH OR OUT-OF-STATE CHECKS.** The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Patsy Stanley @ (601) 359-2804 or
Colleen Downing @ (601) 359-2624

We Buy, Sell & Lease IBM Processors and Peripheral Equipment

Comm. Controllers
3274-51C Ctl
3274-21A SNA Ctl
3299-2 PH 340 cps
Immediate Delivery

4381
4341
Sale/Lease

Printers
4245 4248 3800
3203 3262 3268
Immediate Delivery

Consoles
3880 3274
3803 3276
Display Stations
3278 3178
3279 3179

DASD
3380 3375
3370 3350
Immediate Delivery

TAPE DRIVES
3480 3420
3430 3410
Immediate Delivery

Computer Marketing Inc.
PO BOX C MARGATE, NJ 08402-0430
609/823-6000
Contact/Bernie Geer
Telex: 5106012293

Established 1969

CDLA

THE BULLETIN BOARD

IBM

S/34 . S/36 . S/38
Upgrades/Peripherals
Lowest Price
Call Collect (404) 475-7507
Detamarc Computer Sales
785 Branch Dr. Alpharetta, GA 30201

S/36 S/36
Buy Sell Lease
We Pay Cash
for your used equipment
1-800-LEAS-PAK
In Texas 1-800-722-7911
D/FW Metro 267 2841

3180
3178, 3179,
3278, 3274
All Other IBM Units Available
Call Penny 800 426-4341
in CA 408 241-3677
Marketex Computer Corp

S/38 S/36 S/34
SERIES 1
BUY · SELL · LEASE
Systems Peripherals & Upgrades
Source Data Products Inc.
800 Menlo Avenue # 200
Menlo Park, CA 94025
800 328 2669 415 326 7333

For Sale
IBM 36 400 Megabyte 400 K
IBM Printer 5262 Model 001
600 Lines Per Minute
(5) **5251 IBM CRTs**
Best Offer
Contact Roger Michel
(301) 646-2121

9375-60
2 Or 3 Year Lease
(2) 9335A01 (6) 801
16 Mb Avail 7 24 87
Western Computer Leasing
(602) 997-7245

WANTED
3430-A1
Call Bill Hegan
(914) 238-9631
Computer Merchants Inc

SALE LEASE
4361-ML-5
(12 Mb)
3-8 Comm Lines
1-4 DASD Adapters
NOW
Peripherals Can Be Supplied
Call Bill Hegan (914) 238-9631
Computer Merchants Inc

Private Party For Sale
IBM 4361 (L03) Computer
4 Megabytes
Many Features Including 1200
1601 3201 3202 3701 4 4695 4
Available Immediately
Times Mirror Company
R. Meier (213) 237 3808

BUY • SELL • SAVE $
IBM DISPLAYWRITERS
34'S, 36 S, 36 S
5525 Systems
5219 Printers, 5253-1 Terminals
LRK RESOURCES UNLTD INC
713-437-7375
800-523-8903

MISC.

NEW & USED
RAISED FLOORING
Immediate Delivery
Quality Installation
RAISED COMPUTER FLOORS
One Charles Street
Westwood, NJ 07675
(201) 666-8200
Telex #13-5076

DEC

Rainbow Plus (10MB H D)	$1 595
DECMATE II	$1 295
RAINBOW A	$ 595
PRO 350 (10MB H D)	$1 295
LQP02	$ 795
LA100 PC	$ 550
PCXXF-CD (E T Stand)	$ 95
11 44	$5 595
TU80	$2 895
Kennedy 9300	$2 295
CDC 9715-160	$2 195

Digital
Computer Resale
(713) 445-0082

BUY • SELL • LEASE
DEC
VAX PDP11
New • Used
DCI
(404) 451-9448

BUY • SELL • TRADE
Planning to buy non-DEC memory?
Check our DEC memory prices first!
1184-AA LA180-EA MS750-HB
DZ011-M MS86-CA MS780-JA
HSC50-BA MS630-CA MSV11-JC
KDF11-BE MS750-CA RL02-AK
NEW YORK COMPUTER EXCHANGE
(516)752-8666 (800)645-9109

PRIME

LARGE SELECTION OF USED
PRIME COMPUTER SYSTEMS
SAVINGS TO 50%
Peripherals also available
1st SOLUTIONS INC
11460 N. CAVE CREEK RD
PHOENIX ARIZONA 85020
(602) 997-0997
ASK FOR DON

TSI YOUR FULL LINE VENDOR
FOR ALL YOUR
PRIME COMPUTER NEEDS
Buy • Sell • Lease • Rent
National 800-222-3475
Florida 800-421-4135
Northeast 800-874-3475
Timesharing Services Inc
8780 Woodcock Drive
Jacksonville Fl 32207

BURROUGHS

BUY SELL LEASE
BURROUGHS
B-20 to B-7900
SPECIAL 207 DISK
(10 Units)
B900 DISK PACK (206 Style)
Subsystem
DEPOT
MAINTENANCE
Computer Provisions
(216) 248-7878

SPERRY UNIVAC

Sperry System 80
Full Complement Of Peripherals
System Is Available In July
For More Information Please Contact
Frank Fiammetta (415) 330-4127
VWR Scientific PO Box 7900
San Francisco, CA 94120

DATA GENERAL

NPA SYSTEMS INC
for the SALE, LEASE
PURCHASE & SERVICES OF
DATA GENERAL EQUIPMENT
(516) 467-2500 (NY)
(415) 848-9635 (CA)
DISASTER PLAN & FACILITY
MANAGEMENT ALSO AVAILABLE
* We'll Pay Top $ For MV Systems *

New 10/23/86 Under Full Maint.
MV 4000 32 Bit Processor 4Mb Memory (2) 592Mb Subsystems Battery Backup 1600/6250 BPI Mag Tape Subsystem (2) IAC-16 Terminal Interface IAC-8 Remote Terminal Interface (15) D 215 Terminals 300 LPM Printer Subsystem
Plus Software & Cabinetry
Call (219) 982 2107

Your Ad
Could Be Here
For
$178.00

MISC. SYSTEMS

Special - 9766's
CDC 300Mb Disk Drives
Refurbished
30 Day Warranty
Compatible With All Systems
$3 995 To $4 995
Leasing Computers
Buy Sell
(612) 944-3060

SALE
MIDDORF System 600 45
DPEX (2) 66 mb disk
Terminals & Printers
Immediate Delivery
Price Open
Call Mr. White
434 872-4766

The Bulletin Board
makes selling
your
equipment easy!

HEWLETT PACKARD

S/70 & S/88
Also
HP 2392A Terminals
Qty Available
Quantity Pricing Available
All in stock immediate delivery
Subject to prior sale
All warranted to qualify for
manufacturer's maintenance
BUY * SELL * RENT * LEASE
Processors * Peripherals * Systems
From the HP 3000 Experts!
800/643-4954 213/829-2277
ConAm Corporation
It's Performance That Counts!

HP 3000 • 1000
9000 *and now* **250**
Buy & Sell Worldwide
ENCORE
(213) 452-9117
Telex 756927

WANG

HOLSON ASSOCIATES, INC.
Buy And Sell
Guaranteed
For Wang Maintenance
2470 Windy Hill Road Suite 253
Marietta GA 30067
Call Richard Holley or Carole Benson
(404) 980-1700

BUY - SELL
MVP LVP • OIS • VS • PC
SYSTEMS IN INVENTORY
VS-45 • OIS • VS-100
GENESIS
EQUIPMENT MARKETING
GEM
(602) 277-8230

BUY IN CANADA WHERE YOUR
U.S. DOLLARS GO FURTHER
Systems and Peripherals
Buy and Sell World Wide
Norconex, Ltd
416-738-0803 or 416 738-1059
Telex # 06986391 TOR
FAX 416 738-9013

ORDER FORM

COMPUTERWORLD BULLETIN BOARD

Issue Date: Ads can be accepted up until the Monday preceding the issue desired. **Computerworld** comes out every Monday.

Classifications. Most ads will be classified according to the brand of equipment that is being bought or sold. These classifications include Burroughs, Data General, Digital/DEC, Hewlett Packard, Honeywell, IBM, NCR, Sperry Univac, Salvage, Terminals, Misc. Systems and Miscellaneous.

Copy: Copy sent in via the mail or telecopier (telecopier extensions are 410 and 451) should be clearly typewritten. Ads may be given over the phone to our team of ad takers. The standard size is 1 column by 1 inch deep. These units may be combined to form larger sized ads. Describe the equipment very briefly, give the price and the name of the person to contact. All ads will be set up using a standard format. No borders or logos are allowed.

Cost: The price for each standard unit is $178.00 (One unit minimum and no fractional units allowed.) You must run 4 ads in one month. There are no agency commissions and no quantity discounts.

Billing: Once you've written your ad, send (or call) it in with your name and address for billing purposes and we'll run it. (If your company has never advertised with us before, we request a check with your order.)

Issue Date: _____
Classification: _____
Name: _____
Title: _____
Company: _____
Address: _____
Telephone: _____

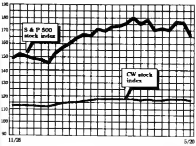
Send this form to:
COMPUTERWORLD BULLETIN BOARD
375 Cochituate Road, Box 9171, Framingham, MA 01701-9171
617-879-0700 800-343-6474

ADVERTISERS INDEX

Adobe Systems PS10
Application Development Systems 46
Attachmate Corporation PS8-9
AT&T 82-83
Bell Atlantic 74
Bendata 44
B.I. Moyle 69
Boston Business Computing PS5
Bridge Communications 68
Business Recovery 61
C. Itoh Electronics 76
Cincom 42-43
Codex 55
Cogros 93
Comdisco 95
Computer Consulting Center 92
Computer Corporation of America 5
Computer Tech Group 28
Compshare 66
Control Data Corp 32-33
CTS/Datacomm 90
CW Circulation 107
CW Spotlight 86
Cybermation 12
Data Access 58
Data General Corp 23
The Data Group 60
Data Switch 92
Dataware 38
D&B Computing 78-79
Desktop Products PS5
Diversified Programming Service Inc 46
Dunhill Personal 61
Eastman Kodak PS4
EMC Corp 80
Execucom PS12
Federal Communications 12
Fibronics 62
4G Data PS6
Genicom Corp PS14
Harris Gov't 72
Hayes Microcomputers PSC3
Hewlett Packard 64-65
Incline Technology 10
Information Builders 12,27,29,31
Informix 30
Interface Systems 8
Language Processors Inc 14
Leasametric PS7
Local Data 22
McDonnell Douglas S2-S3
MCI 40-41
Michaels Ross & Cole, Ltd 39
Microcom PSC4
Mike Murach Asc 9
Motorola Computer Systems S4
MSA 112
MTI Systems Corp PS3
Multisoft PS11
Multi-Tech Systems 45
National Advanced Systems 63,111
NCR 88-89
NEC 70-71
Netserv 59
Novell Inc. 16-17
Oracle 11
Persoft 51
Quadram PS13
Radio Shack 18,47
Realia 19
SAS Institute 36,57
Searchlink PS16
Software AG 24
Software House 85
Software Pursuits 80,61
Sorbus 77
SPSS 84
Syncsort 3
Tandon 56
Technology Concepts 94
Televideo 48-49,81
Universal Data Systems 34
VM Software Inc 7,14
VM/CMS Unlimited, Inc. 26
Walker Interactive 35
Westinghouse 91
Wyse Technology PSC2
Xerox Corp 38-39
Zenith Data Systems 13,15

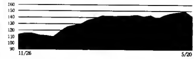
This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.

STOCK TRADING INDEX



Indexes	*Last Week*	*This Week*
Computer Systems	149.2	**141.9**
Supplies & Accessories	150.6	**146.8**
Software & DP Services	134.1	**128.1**
Semiconductors	121.5	**114.0**
Peripherals & Subsystems	132.4	**127.8**
Leasing Companies	119.8	**113.7**
Composite Index	117.6	**116.8**
S&P 500 Index	175.8	**166.4**

Computer Systems



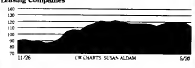
Supplies and Accessories

Software and DP Services

Semiconductors

Peripherals and Subsystems

Leasing Companies



CW CHARTS: SUSAN ALDAM

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY MAY 20 1987

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Systems

EXCH		52 WEEK RANGE (1)		PRICE CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	7	4	4.25	0.1	2.9
O	ALTOS COMPUTER SYS	18	10	12.75	+0.1	+1.0
A	AMDAHL CORP	42	15	34.38	6.1	15.1
O	APOLLO COMPUTER INC	25	9	21.88	1.5	6.4
O	APPLE COMPUTER INC	82	30	74.50	4.0	5.1
N	AT&T	28	22	25.00	1.1	4.3
O	C P T CORP	6	3	3.31	0.4	11.7
N	COMPAQ COMPUTER CORP	51	12	44.25	3.4	7.1
A	COMPUTER CONSOLES INC	12	7	10.00	-0.4	3.6
O	CONCURRENT COMP CORP	19	11	17.25	1.3	6.8
N	CONTROL DATA CORP	35	20	31.00	2.5	7.5
O	CONVERGENT TECH	12	4	6.38	+0.4	+6.3
N	CRAY RESH INC	136	69	108.50	6.0	5.2
O	DAISY SYS CORP	14	8	8.75	0.5	5.4
N	DATA GEN CORP	42	25	33.75	+1.3	+3.8
N	DATAPOINT CORP	9	4	5.00	0.1	2.4
N	DIGITAL EQUIP CORP	175	81	155.38	10.9	6.5
N	FLOATING POINT SYS INC	39	11	10.88	0.6	5.4
N	GOULD INC	24	15	17.00	0.8	4.2
N	HARRIS CORP	43	27	37.38	4.3	10.2
N	HEWLETT PACKARD CO	65	36	62.00	1.3	2.0
N	HONEYWELL INC	84	56	75.38	3.5	4.4
N	IBM	168	116	156.63	9.6	5.8
O	IPL SYS INC	4	2	3.00	+0.0	+0.0
N	ITT CORP	66	44	50.63	3.5	6.5
N	M A COM INC	18	12	13.50	0.6	4.4
N	MATSUSHITA ELEC INDL LTD	136	77	120.25	0.3	0.2
O	MENTOR GRAPHICS CORP	34	11	27.38	4.1	13.1
N	NBI INC	14	8	10.63	0.3	2.3
N	NCR CORP	77	42	70.75	4.8	6.3
N	PRIME COMPUTER INC	30	16	25.13	3.0	10.7
O	STRATUS COMPUTER	41	18	37.00	2.5	6.3
O	SYMBOLICS INC	14	4	4.50	+0.3	+5.9
O	TANDEM COMPUTERS INC	75	28	73.75	+0.0	+0.0
N	TANDY CORP	56	31	38.75	1.6	4.0
N	TEXAS INSTRS INC	203	103	172.75	12.8	6.9
A	ULTIMATE CORP	35	13	22.25	1.6	6.8
N	UNISYS CORP	125	58	113.25	4.5	3.8
A	WANG LABS INC B	19	11	16.63	1.8	9.5
A	WANG LABS INC C	19	11	16.63	1.5	8.3
N	XEROX CORP	81	49	73.50	5.6	7.1

Supplies & Accessories

EXCH		52 WEEK RANGE (1)		PRICE CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMER BUSINESS PRODS	33	23	28.50	-0.4	1.3
N	BARRY WRIGHT CORP	24	14	18.00	1.3	6.5
A	DUPLEX PRODS INC	22	18	18.75	0.4	2.0
N	ENNIS BUSINESS FORMS INC	23	14	19.88	-0.3	-1.3
N	3M CO	140	99	127.00	2.8	2.1
N	MOORE LTD	27	20	23.25	1.4	5.6
O	STANDARD REGISTER CO	53	32	44.00	+0.0	-0.0
N	WALLACE COMPUTER SVCS	50	37	43.00	1.6	3.6

Software & DP Services

EXCH		52 WEEK RANGE (1)		PRICE CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	7	3	4.50	+0.0	+0.0
N	ADVANCED SYS INC	22	12	18.38	1.0	5.2
N	AGS COMPUTERS INC	45	17	41.00	1.8	4.1
O	AMERICAN MGMT SYS INC	38	13	35.75	1.5	4.0
O	AMERICAN SOFTWARE INC	22	7	15.75	2.5	13.7
N	ANACOMP INC	9	3	7.75	1.0	11.4
O	ANALYSTS INTL CORP	11	4	9.50	0.3	2.6
O	ASHTON TATE	30	10	24.75	3.0	10.8
O	ASK COMPUTER SYS INC	17	9	12.25	1.3	9.3
O	ASTRADYNE COMP IND	3	1	1.22	0.1	7.2
N	AUTOMATIC DATA PROC	51	29	42.88	3.0	6.5
O	BOOLE & BABBAGE INC	11	4	9.50	+0.5	+5.6
N	COMPUTER ASSOC INTL INC	28	10	25.38	1.1	4.2
O	COMPUTER HORIZONS CORP	15	10	12.75	-0.4	2.9
O	COMPUTER NETWORK TECH	9	4	4.75	-0.7	12.7
N	COMPUTER SCIENCES CORP	61	30	49.88	3.4	6.3
N	COMPUTER TASK GROUP INC	19	11	15.50	0.8	4.6
O	COMSHARE INC	18	11	15.50	1.3	7.5
N	CULLINET SOFTWARE INC	16	6	10.50	+0.0	+0.0
O	CYCARE SYS INC	17	7	6.00	+0.0	+0.0
O	DUQUESNE SYS INC	33	12	26.00	2.0	7.1
N	GENERAL ELEC CO	113	71	100.00	4.0	3.8
N	GENERAL MTRS CORP (CLASS E)	49	24	40.75	2.3	5.2
O	HOGAN SYS INC	17	9	15.38	0.8	4.7
O	INFORMATION SCIENCES INC	4	1	1.00	0.1	11.1
O	INFOTRON SYS CORP	17	7	10.50	-0.5	4.5
O	KEANE INC	16	5	9.00	+0.1	+1.4
N	LOGICON INC	38	22	27.13	1.4	4.8
O	LOTUS DEV CORP	37	9	31.88	3.4	9.6
O	MANAGEMENT SCI AMER	21	12	12.13	1.0	7.6
O	MCI COMM CORP	11	5	6.38	-0.3	3.8
O	MICOM SYS INC	18	10	15.00	2.0	11.8
O	MICRO PRO INTL CORP	8	2	7.25	+0.9	+13.7
N	MICROSOFT CORP	128	26	109.50	12.3	10.1
O	NATIONAL DATA CORP	27	16	22.13	+0.1	+0.6
N	ON LINE SOFTWARE INT	24	10	26.50	+0.0	+0.0
O	ORACLE SYS CORP	30	7	24.00	3.3	11.9
N	PANSOPHIC SYS INC	23	12	19.00	3.1	14.1
O	POLICY MGMT SYS CORP	30	15	23.50	1.5	6.0
O	PROGRAMMING & SYS INC	13	8	10.50	+0.3	+2.4
O	REYNOLDS & REYNOLDS CO	42	27	34.25	1.3	3.5
O	SCIENTIFIC COMPUTERS INC	8	4	7.75	+0.1	+1.6
O	SEI CORP	33	15	30.00	0.8	2.4
O	SHARED MED SYS CORP	53	28	27.75	1.8	5.9
O	SOFTWARE AG SYSTEMS INC	20	10	11.88	-0.3	2.1
O	SOFTWARE PUBG CORP	17	5	14.75	1.0	6.3
A	STERLING SOFTWARE INC	21	9	10.63	0.1	1.2
N	SUNGUARD DATA SYSTEMS	21	10	16.50	1.0	5.1
N	UCCEL CORP	36	16	32.00	1.6	4.8
N	URS CORP	21	13	16.63	0.5	2.9
O	VM SOFTWARE INC	45	18	30.50	2.3	6.9

Semiconductors

EXCH		52 WEEK RANGE (1)		PRICE CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	27	13	20.13	1.6	7.5
N	ANALOG DEVICES INC	24	14	21.88	0.5	2.2
O	ANALOGIC CORP	13	10	11.13	0.8	6.3
N	APPLIED MAGNETICS CORP	40	13	34.63	3.5	9.2
O	AVANTEK INC	20	13	13.38	1.4	9.3
O	HADCO CORP	7	3	6.00	0.3	4.0
O	INTEL CORP	48	16	41.75	3.0	6.7
O	MICRO MASK INC	7	2	6.63	0.1	1.9
N	MOTOROLA INC	64	34	53.38	7.9	12.9
N	NATIONAL SEMICONDUCTOR	17	8	14.13	0.6	4.2
N	TERADYNE INC	29	16	25.63	1.0	3.6

EXCH N=NEW YORK A=AMERICAN P=PACIFIC B=BOSTON
L=NATIONAL M=MIDWEST O=OVER THE COUNTER S=SPLIT

Peripherals & Subsystems

EXCH		52 WEEK RANGE (1)		PRICE CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
A	AM INTL INC	9	5	6.25	0.3	3.8
A	ANDERSON JACOBSON INC	4	[illegible]	2.25	-0.4	-20.0
O	AST RESH INC	23	11	16.50	1.0	5.[illegible]
O	AUTOTROL CORP	10	5	9.63	-0.4	3.8
O	AVANT GARDE COMPUTING	7	3	3.75	-0.1	3.2
O	BANCTEC INC	14	6	12.50	1.0	7.4
N	BOLT BERANEK & NEWMAN	60	37	44.00	2.5	5.4
A	CETEC CORP	8	5	5.63	-0.3	4.3
A	COGNITRONICS CORP	5	2	3.88	0.3	6.[illegible]
N	COMPUGRAPHIC CORP	24	16	21.38	0.4	1.7
N	COMPUTERVISION CORP	23	10	15.50	2.6	14.5
N	CONRAC CORP	30	12	27.13	+0.0	+0.0
A	DATAPRODUCTS CORP	18	10	10.25	1.4	11.8
A	DATARAM CORP	17	7	7.25	-0.0	-0.0
O	DATA SWITCH CORP	9	5	7.13	-0.8	9.5
O	DATUM INC	7	4	5.75	+0.1	+2.2
N	DECISION INDS CORP	15	7	7.63	0.3	3.2
O	ENDATA INC	10	5	10.13	-0.0	-0.0
O	EMC CORP	44	11	26.75	-0.3	0.9
O	EVANS & SUTHERLAND	40	20	30.88	1.4	4.3
N	FLOATING POINT SYS INC	39	11	10.88	0.6	5.4
O	GANDALF TECHNOLOGIES	11	5	8.38	0.4	4.3
N	GENERAL DATACOMM IND	15	8	11.63	1.6	12.3
O	ICOT CORP	13	5	6.38	-0.1	1.9
O	INFORMATION INTL INC	18	13	14.00	+0.0	+0.0
O	INTERLEAF INC	20	8	18.38	1.8	6.[illegible]
O	MEGADATA CORP	7	2	4.88	0.1	2.5
A	MSI DATA CORP	17	10	14.38	+0.4	+2.[illegible]
A	NASHUA CORP	31	21	27.88	1.1	3.9
O	NETWORK SYS CORP	19	9	8.88	0.1	1.4
N	NORTH AMERN PHILIPS CORP	46	35	42.50	-0.6	-1.5
N	NORTHERN TELECOM LTD	46	27	38.75	2.3	5.8
O	NOVELL INC	27	9	24.25	1.5	5.8
N	PARADYNE CORP	11	4	6.25	-0.0	-0.0
A	PENRIL CORP	8	4	4.75	0.5	9.5
N	PLESSEY PLC	41	24	40.00	+1.4	+3.6
O	PRINTRONIX INC	14	10	11.75	0.1	1.1
N	QMS INC	16	11	14.88	0.8	4.8
O	RAMTEK CORP	6	4	4.25	0.1	2.9
N	RECOGNITION EQUIP INC	27	10	17.88	1.6	8.9
O	SCAN TRON CORP	19	11	14.50	0.3	2.1
N	SCIENTIFIC ATLANTA INC	19	9	16.63	1.3	7.0
O	SEAGATE TECHNOLOGY	45	10	40.25	3.8	8.5
N	STORAGE TECHNOLOGY	5	2	4.25	-0.0	-0.0
O	SUN MICROSYSTEM INC	44	11	42.25	-2.1	-5.3
A	T BAR INC	8	5	6.00	+0.0	+0.0
A	TAB PRODS CO	21	12	7.88	0.8	4.0
O	TANDON CORP	8	2	5.50	0.1	2.2
A	TEC INC	6	3	3.25	0.1	3.7
N	TEKTRONIX INC	43	27	33.75	0.5	1.5
O	TELEVIDEO SYS INC	4	2	2.75	0.1	4.3
N	TELEX CORP	107	52	74.00	5.5	6.9
N	TIMEPLEX INC	41	14	34.50	3.6	9.5
N	TITAN CORP	11	6	6.00	0.4	5.9
O	WYSE TECH	33	13	29.63	2.4	7.4

Leasing Companies

EXCH		52 WEEK RANGE (1)		PRICE CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	33	15	29.00	3.9	11.6
N	CONTINENTAL INFO SYS	13	7	11.13	0.5	4.3
O	FINALCO GROUP INC	4	2	2.88	+0.0	+0.0
O	PHOENIX AMERN INC	8	3	5.13	0.5	8.9
O	SELECTERM INC	8	5	5.13	-0.0	-0.0
N	U S LEASING	53	38	49.50	2.9	5.5

Downhill racers

High-tech stocks drop; IBM rides roller coaster

Technology stocks dipped across the board last week, following the lead of a market in which declining issues heavily outnumbered advancing stocks.

IBM, after starting the week at 160⅝, down 4½ points from the previous week, climbed ¾ of a point on Monday but then dropped an additional 4½ points to close at 156¾ on Tuesday.

At the close of business on Thursday, IBM stood at 157¼.

Even financial reports showing increased sales and earnings could not raise share prices on Tuesday for Palo Alto, Calif.-based Hewlett-Packard Co. or Torrance, Calif.-based Ashton-Tate

HP, with profits of 63 cents per share reported for the second quarter, dropped to 62⅝ on Tuesday, down 1½ points. The stock dropped an additional ⅜ of a point on Wednesday and stood at 62⅜ on Thursday.

Ashton-Tate, which recorded earnings of 36 cents per share, watched its stock fall 1½ points to 24¼ on Tuesday. The stock climbed to 25½ by Thursday but fell short of its 52-week high of 30¼.

ALAN J. RYAN

IBM plans June flood of intros

BY JAMES CONNOLLY
CW STAFF

Even before the dust settled, speculation began last week about which expected products IBM failed to announce and which of them might be introduced in the near future.

Industry observers reported last week that IBM is planning three waves of product introductions, including entirely new systems and minor enhancements, in June.

An official with a company that competes with IBM in the communications field reported that two of the announcement dates are June 2 and 30.

The announcement set for next week reportedly will be communications-oriented, with enhancements to the IBM 3725 and 3720 communications processors being designed to let IBM's Network Control Program (NCP) manage PU2.1 communications on a peer-to-peer network without going through VTAM.

Could leave gaps

But that announcement also reportedly leaves open several holes, the first being that the PU2.1 used in the Advanced Peer-to-Peer Network announced last year for the System/36 and 38 will have to be modified at a later date to be compatible with the NCP's PU2.1. The NCP enhancement also reportedly offers no peer-to-peer help for the IBM 9370 mid-range systems that use VTAM. The only help for 9370 users is said to be a multidrop capability. Other analysts continued to predict a low-end and a high-end 9370 model.

Other June 2 announcements are expected to include IBM VM enhancements to improve the user interface, a high-end version of VM/XA, Token-Ring local-area network modifications to ease setup and installation, 3174 controller enhancements and a new 3192 terminal.

The June 30 announcement reportedly will focus on hardware and software enhancements to the IBM System/88, the fault-tolerant processing system made by Stratus Computer, Inc.

Introductions at NCC?

Meanwhile, officials of the National Computer Conference, which is scheduled for June 15 to 18 in Chicago, report that IBM has scheduled several press conferences for the show. It was at NCC in 1983 that IBM introduced the System/36 and at NCC in 1986 that the company announced new models and communications tools for the System/36 and 38.

Several analysts speculated last week that on June 16, IBM will introduce the long-expected follow-on to the System/36 and 38, which is commonly known as Silverlake. IBM recently told consultants that Silverlake will be based on a 9370 chassis but will run System/38 CPF software and System/36 on plug-in CPU boards. Silverlake systems reportedly could be delivered by the fall if they are announced in June.

In connection with the Silverlake speculation, analysts said IBM is still likely to provide a temporary growth path for System/38 Model 700 users. A key announcement expected in the mainframe arena is a triple-density version of the IBM 3380 disk drive. Dual-density versions now provide 5G bytes of storage. However, analyst opinions were split on whether IBM is ready to announce faster access times, increased cache and faster channel speeds for those drives.

Senior Editor Charles Babcock contributed to this report.

IBM carves

FROM PAGE 1

ing purposes, while the 150E is a "Group 40" machine.

"The graduated pricing is part of a larger strategy to remove software pricing as an issue when considering IBM machines," said Peter Braude, vice-president of the Gartner Group, Inc. in Stamford, Conn.

"Our customers said the cost of our software was inhibiting them from distributing MVS/XA on 4381s," said Peter N. Clough, administrator of large systems marketing for the IBM Information Systems Group in Rye Brook, N.Y.

In addition to graduated MVS/XA pricing, IBM introduced four 4381 models that offer significant price/performance improvements. The cost per million instructions per second (MIPS) on a new 4381 Model 23 is estimated to have dropped to $110,000, compared with $118,000 for its predecessor.

On the new low-end 3090 Model 120E, the price for a basic system configuration dropped to $985,000 from $1.65 million for the former low-end Model 150E. Both of the new processors fall into the Group 30 tier, meaning their users could add an additional $200,000 savings to the expense of MVS/XA during a four-year period, IBM officials said.

Another IBM goal of the improved pricing structure for mid-range mainframe users is to encourage VSE operating system customers to move to MVS/XA.

In case anybody did not get the hint from the pricing incentives, IBM announced a repackaged software unit plus services, known as a Solutionpac, for migrating from its older VSE operating system to MVS/XA. "It's a major attempt by IBM to get VSE players to play MVS/XA ball," said Peter L. Burris, analyst with International Data Corp. (IDC), a market research firm in Framingham, Mass.

An estimated 33% of the 27,000 IBM mainframe sites in the U.S. were running VSE at the end of 1986, according to figures released by IDC. An even higher 37% of the large mainframes likely to serve as platforms for MVS/XA still run VSE, according to IDC.

With the graduated pricing scheme, a user of the new 4381 Model 23 can run MVS/XA during a four-year period at a price of $392,790, a $200,000 saving over the previous one-price-tag-suits-all pricing structure.

On the other hand, the users of 3090 Model 200 mainframes or larger machines will find the price of MVS/XA is $626,620 for four years, or $34,000 higher than it used to be, IBM pricing figures indicated.

Brown said IBM's desire to migrate VSE users to MVS/XA is a warning that VSE has a limited future. "This is a glaring red traffic light saying VSE is not going to be supported in a few years," Brown said.

Those users can stay with VSE for as long as possible at the risk of being left without future operating system enhancements, shift to MVS/XA — with its related system operator and software expenses — or search for another vendor, Brown said.

"It's got to be a hell of an organizational drag on IBM. Every time it considers a future direction, those 9,000 VSE customers have to be considered," IDC's Burris said.

Follow-up to '86

The graduated pricing announcement was seen by analysts and customers as a follow-up to IBM's announcement in October 1986 of graduated pricing for VSE and VM. Prior to that announcement, IBM had set one price for its software — regardless of the size of the mainframe on which it ran.

In another pricing innovation, IBM introduced volume discounts for VM and VSE in October 1986 and after Tuesday's announcement will offer substantial savings to MVS/XA customers as well.

Ordering the operating system in a quantity of three yields an automatic 10% discount, Clough said. An order of five gives the customer a 15% discount; 10, a 20% discount and 20, a 25% discount, he said.

An additional saving is offered to non-MVS customers who decide to migrate to MVS/XA. Migrators can deduct 25% off the graduated charge for MVS/XA, or they can sign up for a migration assistance package that waives the initial license charge and monthly fees for eight months. At the end of eight months, the user pays the charge and 50% of the monthly fees during the next 12 months.

"We've narrowed the gap a lot between VSE and XA," Clough said. He said the typical VSE user also uses the VM operating system and pays out $366,000 during a four-year period. MVS/XA on a 4381 prior to Tuesday's announcement cost $677,000 during the same period. A typical configuration now would be licensed for $458,000.

Pricing on the high end of the new hardware introductions, the 3090 Model 120E, was set at a minimum of $715,000 for the processor and $120,000 for the 3092 Model 3 controller. IBM officials said a base price for the processor complex is $985,000. That compares with the previous low-end price of $1.6 million for the Model 150E.

Another observer who warned that the 3090 Model 120E could be a trap was Svend E. Hartmann, president of Computer Merchants, Inc., a Chappaqua, N.Y., computer sales and leasing company.

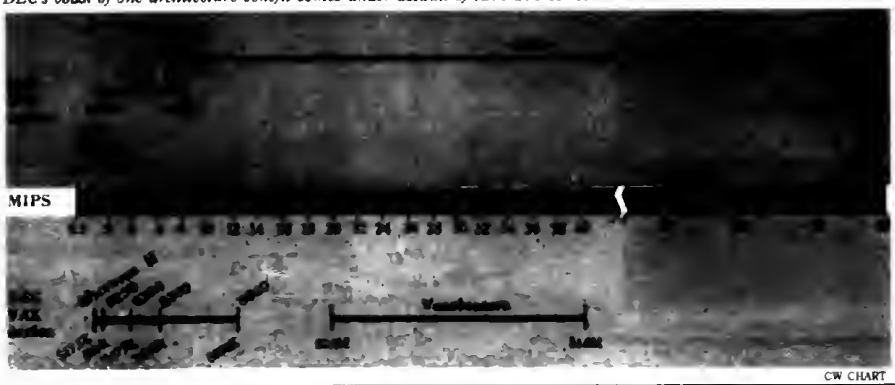
"It's always been tough to know what is going to happen with these low-end, low-priced machines. Whenever you look at them, they turn out to be very bad buys when you turn around and try to sell them on the used market a few years later," Hartmann said.

He compared the Model 120E with other low-end machines added to processor families at mid-life, which became outdated by the time users were ready to upgrade them to more powerful models.

"The thinking that IBM wants you to adopt is that you can start with this model and upgrade it a year or so later," said Hartmann, who tracks used computer values. "The problem is that new machines come online faster than you can upgrade or need the excess capacity," Hartmann added.

Hatfields and McCoys

DEC's boast of one architecture benefit comes under assault of IBM 370 series



DB2, SQL/DS upgrades join relational family

BY CHARLES BABCOCK
CW STAFF

NEW YORK — IBM's Release 3.0 of its fast-growing DB2 data base management system offered few impressive technical innovations when announced last week, but it illustrated how IBM is trying to build up its "family" of relational software.

The primary DB2 enhancements included a catalog extension, dubbed a directory; support for time, date and time stamp data types; an increase in the maximum DB2 buffer pool size; and support for floating-point data of single-byte precision.

At the same time, IBM said DB2's second cousin, SQL/DS, the relational product for the VM and VSE operating systems, has been made "more consistent with DB2" and that the SQL used with both has been brought into closer kinship.

"Complex queries will still yield different results in some circumstances, but we can tell you when. We are managing any differences out of the two products," said IBM's Russell T. Donovan, data base products marketing manager. The data access manager was rewritten for Version 2.1 of SQL/DS to make it function more like DB2, Donovan said.

Both Version 2.1 of SQL/DS and the new Version 2.2 of IBM's Query Management Facility (QMF) will support the time, date, time stamp and single-byte precision floating-point data types, as well as DB2. A single-byte precision data element can be limited to seven characters; in the past, DB2 required double-byte precision data elements requiring 15 characters each.

Save our space

"That's going to save us a lot of DASD space," said a large-system user of DB2 in Chicago.

"What you see are all the canaries singing at one time," said Michael Braude, vice-president of the Gartner Group, Inc., a market research firm in Stamford, Conn. In the past, IBM has not treated its relational products as a related group, nor has the company attempted to upgrade them concurrently, he said.

Although the SQL used for SQL/DS and DB2 still does not fully comply with the ANSI standard for SQL, Donovan said it is now "much closer" to that standard. IBM first referred to its family of relational products with the announcement of a new operating system for its Personal System/2 family of personal computers. OS/2 Extended Edition will have a relational DBMS that will also be "consistent with DB2," IBM said in April.

In addition, IBM attempted to further widen the appeal of DB2 by providing a VSAM transparency package that would allow customers to move VSAM data into DB2 but continue to run VSAM-based applications.

Automating DASD control

IBM enhances system-managed storage products Page 110.

IBM spokesmen said many DB2 users still rely on aging VSAM applications "that they could never justify converting." The transparency software, priced at $11,000 and set to be available in March 1988, will help them to make the transition to DB2 without rewriting, recompiling and relinking and editing the programs, Donovan said.

The $14,000 directory, which will function for both DB2 and SQL/DS, will extend the system catalog and was "clearly designed to answer some of the criticisms of DB2's not having a data dictionary," said David G. McKay, senior consultant with Knauer Consulting, Inc.

IBM's Donovan termed it a "tactical solution needed today" but not the long-term solution needed to provide referential integrity and other integrity controls over the DBMS. The directory will consist of DB2 tables devoted to system use that can contain data types, objects and table definitions. It will be interactive with users through IBM's Interactive System Productivity Facility screens. Any changes made to the directory will require the tables to be locked, and Donovan said IBM decided the locking should be limited to the directory. Locking DB2 catalogs could interfere with system processing, another obstacle that must be overcome before IBM can field an active data dictionary, other observers said.

Short life span?

"This product [the directory] is going to have a short life," Braude predicted.

The DB2 version is slated to be available in September, while the SQL/DS version is slated for March 1988.

In addition, IBM announced the following:

- Version 2.2 of Data Extract, which removes data from IMS and VSAM files and loads it into DB2 or SQL/DS files, or vice versa. The release supports the new data types in DB2 and SQL/DS. Priced at $300 a month, it is set to be available June 26.
- A tool for data base application development, marketed as part of IBM's Solutionpac. The package includes on-site training in the use of IBM's fourth-generation language, Cross System Product (CSP), to develop applications for DB2 or SQL/DS. Data base software, CSP and QMF are included in the package, priced at $74,200 under MVS and $72,200 under VM/VSE. It is scheduled to be available in October.
- Release 4.0 of TSO Extensions, a teleprocessing monitor for MVS/XA, with new exits, restructured library and application installation and menu management aid. Priced at $1,500 for an initial license and $555 a month, it is set to be available Sept. 25.
- Query DL/1 allows on-line access to data in DL/1 data bases directly from the IMS/DS and CICS transaction processing environments. Priced at $14,400 under DOS or VSE and $24,400 under MVS, it is set to be available June 26.

IBM CPUs

FROM PAGE 1

International Data Corp. in Framingham, Mass.

"There was pressure on IBM to provide the air-cooled contingent some place to go," Mikita added, referring to users of the air-cooled 4381s. "They weren't successful drawing them to the water-cooled 3090s."

In filling the performance gap, IBM also appeared to aim at the market for used 3080 models, said Rick Martin, an analyst with Sanford C. Bernstein & Co. in New York. The 3081 average price was $700,000 to $1 million for a machine that performs 8 million instructions per second — precisely the price/performance range targeted by the new processors, Martin said.

Analysts agreed that the new models give the 4381 line about two more years of life. "They have to leave the 4381 alone for a couple of years," said Per Flaatten of Arthur Andersen & Co. in Chicago.

Oscar Rothenbuecher of Arthur D. Little, Inc. in Cambridge, Mass., predicted, "The 4381 will be replaced, more likely in 1989, because the system architecture will run up against limitations in storage."

In an attempt to stimulate demand for the new processors, IBM announced two incentive programs and a price cut of 5% to 9% on existing 4381s.

In a two-stage shipment plan that continues the upgrade policy announced with the 3090E models earlier this year, IBM will ship either a Model 11, 12, 13 or 14 to customers ordering the new models until Nov. 30. A conversion kit will be delivered in the first quarter of 1988 to upgrade the processor's performance. Those ordering according to this plan will get discounts from $20,000 to $75,000.

Upgrades in '88

Upgrades for users who wish to convert their present 4381 to one of the new models will also be available in the first quarter of 1988, according to IBM.

In addition, IBM is allowing customers to pay for a 3090 Model 120E or 150E six months after the date of installation. The Model 120E will be available in October, IBM said. IBM claimed the new 4381s have 30% faster throughput in commercial applications than current models and are 12% faster in engineering or scientific work.

Although IBM said it would continue to market 4381 Models 11, 12, 13 and 14, analysts expect the firm to eventually discontinue those processors because the Models 22 and 23 offer better price/performance.

Bob Smith, data center manager for Rosemount, Inc. in Eden Prairie, Minn., welcomes the new products because they allow him room to grow. Smith said his shop has been nearing capacity on Models 13 and 14, but with the announcements, he said he can now see 65% to 70% possible growth with an extended life span of two to three years.

Smith, who is now using 32M bytes of memory on both systems, said he is pleased that he can increase to 40M and 64M bytes, respectively. The upgrade price seems cost-effective and is "much better than going to a 3090," Smith added. IBM lists upgrades from Model 14 to Model 24 at prices ranging from $260,000 to $500,000.

Of the new 4381s, Models 21, 22 and 23 are uniprocessors, and the Model 24 is a dual processor. All run the full complement of 370 operating systems.

The 4381 Models 22, 23 and 24 use IBM's faster, second-generation 1M-bit random-access memory, which allows the latter two systems to offer up to 64M bytes of main memory, double the memory capacity of existing units. The two high-end systems also feature faster cycle times of 52 nsec, IBM said.

IBM is offering a serial interface, previously available on the 9370 and 4361, to allow other vendors' equipment to attach to the new 4381s. Moreover, the entry-level model can be equipped with up to 12 3M-byte I/O channels, while the Model 24 can be configured with up to 24 channels. Earlier models could only support up to 12 channels, only four of which handled 3M-bit data rates.

The 3090 Model 120E, which is field upgradable to the Model 150E, uses the same 1M-bit technology and thermal conduction module used in other 3090E series models, IBM said. The processor supports 32M bytes of main storage, which is expandable up to 128M bytes. The base configuration includes 16 channels operating at 32M bytes and can be expanded to 24 channels.

IBM is offering an optional vector facility for $325,000 that is said to provide 2.2 to 6.1 times the system's scalar performance.

While analysts predict a bright market future for the new 4381s, they are somewhat less optimistic about the 3090 120E. "The question is, Is it doomed to repeat the 3083 CX history?," IDC's Mikita asked. "It probably will not do much better than the CX. There was overlap before with the 4381 and the 3083 CX before this announcement."

Martin of Sanford Bernstein added, "I wouldn't expect the 3090 Model E to be a barn burner, but the 4381s will sell like hotcakes."

IBM moves

Offerings fill and extend mid-range

4381 models

Old Model	Old MIPS*	Old Price	New Model	New MIPS	New Price
11	1.5	$185,000	21	2.3	$225,000
12	2.8	$330,000	22	3.3	$350,000
13	3.5	$440,000	23	4.7	$530,000
14	6	$850,000	24	7.8	$890,000

(Each in suggested basic configurations)

3090 models

New low-end 3090 120E compared with previous low-end 3090 150E

Model	MIPS	Price	Model	MIPS	Price
150E	10.1	$1.65M	120E	7.5	$985,000

(Each in suggested basic configurations)
* Million instructions per second

CW CHART

IBM storage tools enhanced

Boosted system-managed software cuts needed DASD-related manpower

BY JAMES CONNOLLY
CW STAFF

RYE BROOK, N.Y. — IBM took another step last week in its 5-year plan to minimize operator involvement in disk management with the announcement of enhanced disk-backup and space-allocation software.

That plan for system-managed storage, which is IBM's response to 1984 requests by IBM users groups Guide International Corp. and Share, Inc., calls for storage automation to reduce the number of operators needed for direct-access storage device (DASD) management and to improve DASD planning.

The announced releases of IBM's Data Facility Data Set Services (DFDSS) and Data Facility Hierarchical Storage Manager (DFHSM) are apparently meant to strengthen IBM's position in competition with third-party software vendors such as Sterling Software, Inc. and Uccel Corp., which provide data storage management utilities.

DFDSS Version 2, Release 3 reportedly includes support for the interactive storage management facility (ISMF) of IBM's MVS/XA Data Facility Product. With ISMF, DFDSS provides specific disk-volume support for commands such as copy, dump, restore, release and compress, plus specific data sets, according to James Garner, IBM senior market support representative.

Garner said DFDSS now automates defragmentation or consolidation of DASD volumes, allowing users to better utilize disk space. That capability is particularly important in active volumes, in which the constant addition and removal of data sets tends to leave unutilized disk space.

The new release of DFDSS is also intended to make it easier to move data from one device type to another, such as from an IBM 3380 disk drive to an IBM 3350 drive. The release also supports the VSAM linear data sets introduced by IBM last year.

IBM claimed a 40% performance gain in copying sequential and partitioned data sets from a 3350 to a 3380 in one comparison between DFDSS Version 2, Release 3 and Release 2.

DFHSM Version 2, Release 3 and DFDSS working together reportedly transform manual volume-dump operations into automated dump and incremental backup functions. IBM said DFHSM now supports use of DFDSS for physical volume dumps and incremental backup, volume restore and incremental recover and data set restore and recover. It also features support for the IBM 3480 Models A11 and B11 tape drives. It had previously supported only the 3480 Models A22 and B22.

Don Murphy, vice-president for sales and marketing with the Sterling Software Marketing division of Sterling Software, noted that IBM made progress with its data storage management announcements. But, he added, "The IBM products are now coming up to speed with products we were selling six or seven years ago."

He also claimed that companies such as his have a built-in advantage against IBM. "We're in the business of saving people DASD space. IBM is in the business of selling it," Murphy said.

Fred Moore, marketing director of Storage Technology Corp., in Louisville, Colo., reported storage management is a growing concern but that only 10% of the large-system user base currently manages its own storage, although 60% of all large MIS shops of those users have installed storage management software.

Murphy added, "A discouraging percentage of people are doing storage management, and that's because they keep throwing hardware at their problems. One thing that helps us is that at least IBM is talking about system-managed storage now. They are blessing it."

3Com claims easy 386 migration

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — 3Com Corp. has good news for the owners of 8,000 of its 3Server3s: Server migration of the Intel Corp. 80386 processor and the Microsoft Corp. MS OS/2 and LAN Manager will be fairly painless and will not make the installed base obsolete.

Users of 3Com's current 186-based 3Server3s can expect to support Microsoft's MS-DOS and MS OS/2 and Apple Computer, Inc.'s Macintosh workstations, according to 3Com Chairman Robert Metcalfe. He also promised users the following:

- 3Server3s shipping today will be able to support MS OS/2 and the LAN Manager with little or no software modifications.
- 3Com will provide a hardware upgrade to allow 3Server3s to migrate to the 386 standard and support MS OS/2. "The purpose of the 386 upgrade is to allow the customer to run server-based applications under [MS] OS/2," Metcalfe said, adding that he expects such applications to appear around mid-1988. He did not give a delivery date.
- Advanced 3System, a high-end 386-based file server with a much larger disk and greater computing power, will be available in late 1987.

In addition, users who buy a new 3Server3 to replace an existing personal computer-based server will reportedly be able to trade in their 3Plus for PC server or any other network operating system for 3Plus for 3Server3 until Aug. 31.

Second-class postage paid at Framingham, Mass., and additional mailing offices
Computerworld (ISSN-0010-4841) is published weekly, except January (5 issues), February (5 issues), March (6 issues), April (5 issues), May (5 issues), June (6 issues), July (5 issues), August (6 issues), September (5 issues), October (5 issues), November (5 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.
Copyright 1987 by CW Communications/Inc. All rights reserved.
Computerworld can be purchased on 35 mm microfilm through University Microfilms Int., Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed; write to Circulation Dept. for subscription information.
Photocopy rights: permission to photocopy for internal or personal use of the internal or personal use of specific clients is granted by CW Communications/Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 21 Congress Street, Salem, Mass. 01970.
Permission to photocopy does not extend to contributed articles followed by this symbol: ‡
Special requests for reprints and permission should be addressed to Nancy M. Shannon, CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171. Subscriptions call toll free (800) 544-3712 or (215) 568-0388 in Pennsylvania.
Subscription rates: $2.00 a copy. U.S. — $44 a year. Canada, Central & So. America — $110 a year. Europe — $165 a year, all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

ABP

POSTMASTER: Send Form 3579 (Change of Address) to *Computerworld*, Circulation Department, P.O. Box 1016, Southeastern, PA 19398-9984

INSIDE LINES

It's a natural. Microsoft has plunked $1 million into Natural Language, Inc. and has an agreement to use that firm's natural-language interface for SQL-based data bases in an unannounced Microsoft product. The deal is set to be announced in early June.

Back from the brink. Storage Technology expects to end its 2½-year exile to Chapter 11 on June 18. That's when the company hopes a bankruptcy court judge will approve the disk and tape drive vendor's plan of reorganization. In conjunction with that motion, Storage Technology last week executed a $50 million line of credit with six financial institutions for backup funding and bridge financing.

Mainframe software seeks good home. Nomad2 is roaming the software desert in search of a home. Reports are surfacing in volume that D&B Computer Services is looking for a buyer for the erstwhile fourth-generation language, which is one of the oldest on the market but which has been spiffed up recently with a new interface and IBM DB2 compatibility. D&B has been shopping Nomad2 around to some big-name mainframe and even micro software players, but no one has yet agreed to adopt the software or its reported $15 million to $20 million price tag.

Canaan's last stand? Following layoffs and restructuring one month ago, Canaan Computer seems to have taken a turn for the worse. The firm's management team has been replaced by personnel from the company's lead investor, Hambrecht & Quist. Jerry Burk of H & Q is currently president, and Mike Preletz now CEO, of Canaan. A source close to the company also says only 16 employees remain at the Trumbull, Conn., manufacturer of VM/CMS-based departmental computers. Canaan has been in the red since its founding in 1981. It had apparently targeted a vacant market niche — until IBM announced its 9370 departmental processor last fall.

Never clone alone. The latest word on Novell's efforts to port Advanced Netware to the Intel 80386 operating environment goes like this: Novell is building an environment consisting of Advanced Netware/386 integrated with PC-MOS from The Software Link and Desqview, the Microsoft Windows-compatible environment from Quarterdeck Office Systems. Novell also intends to graft Softcraft's Btreive and IBM gateways from CXI into Netware. The result — network and 386 operating systems with built in connectivity and data base support — should sound pretty familiar to fans of IBM's OS/2 and OS/Extended.

Just don't call customer support. Sources have spotted copies of the original Visicalc for sale at Lechmere, an East Coast department store chain. And incredibly, the package is still sporting its full list price. It looks and feels like customers get burned on this one.

Might as well announce 'em. Wang Laboratories, Inc. this week will formally announce microcomputers that have already been shipping to customers. The machines comprise an entirely new line of Intel 80286 and 80386 micros that solve the hardware compatability problems of Wang's earlier PC line, which will remain on the market.

$99 and words to boot. Lifetree Software will this week cut the price of Word & Figures in half to $99. The product, a Lotus 1-2-3 clone with built-in word processing, is not currently the target of Lotus attorneys and has recieved rave reviews. Sales to large accounts, however, have suffered due to the specter of a possible look-and-feel lawsuit.

Say what? Reports comparing IBM and DEC are springing up everywhere these days, and it's a comparison that IBM apparently is not taking lightly. Not only is IBM offering bonuses to sales staff selling into DEC accounts, but IBM has begun to "bad-mouth" DEC in sessions with end users, an MIS director with a Fortune 100 company reports. "It's almost a paranoia with them," he says. DEC can consider IBM's wrath a left-handed compliment, though, the user says, noting that Big Blue reps still refuse to acknowledge that vendors like Wang, DG and HP even exist.

You can't beat this moment.

This is the moment in which true winning occurs.

Because when a frontrunner pushes past all limitations to reach e significant goal, the exhilaration of personal achievement combined with shared success is as breathtaking es breaking through to the finish line.

NAS Sales Professionals are our frontrunners, leading the way for the victory and goal attainment which follow. We've created e winning strategy based on the synergy of many individuals contributing their best qualities that benefits customers, employees, and the companies which provide NAS with advanced technology equipment.

Through our system of high performance partnerships, NAS has become a prestigious worldwide marketing company with a broad range of medium to large-scale IBM compatible systems and storage solutions.

With all the strength and success behind NAS, and with great expectations for future achievement, we pass the baton on to highly motivated professionals in high tech sales. Currently, we have outstanding opportunities throughout the country for:

Marketing Representatives

You will develop strategies and contact prospective customers, while servicing established accounts in your area. NAS will back your endeavors with a highly integrated network of customer service and support, as well as a flexible marketing system which will allow you to be responsive to your customers' needs. Our ideal candidate will have 2-4 years' sales experience which relates to the IBM compatible environment. You should also be an energetic and motivated individual who enjoys independence and teamwork

If you'd like to see whet it feels like to perform with the best, connect with NAS and enjoy professional growth along with attractive salary incentives and benefits. Contact us toll-free any day (especially today!) between 8:00AM-8:00PM DST, et·

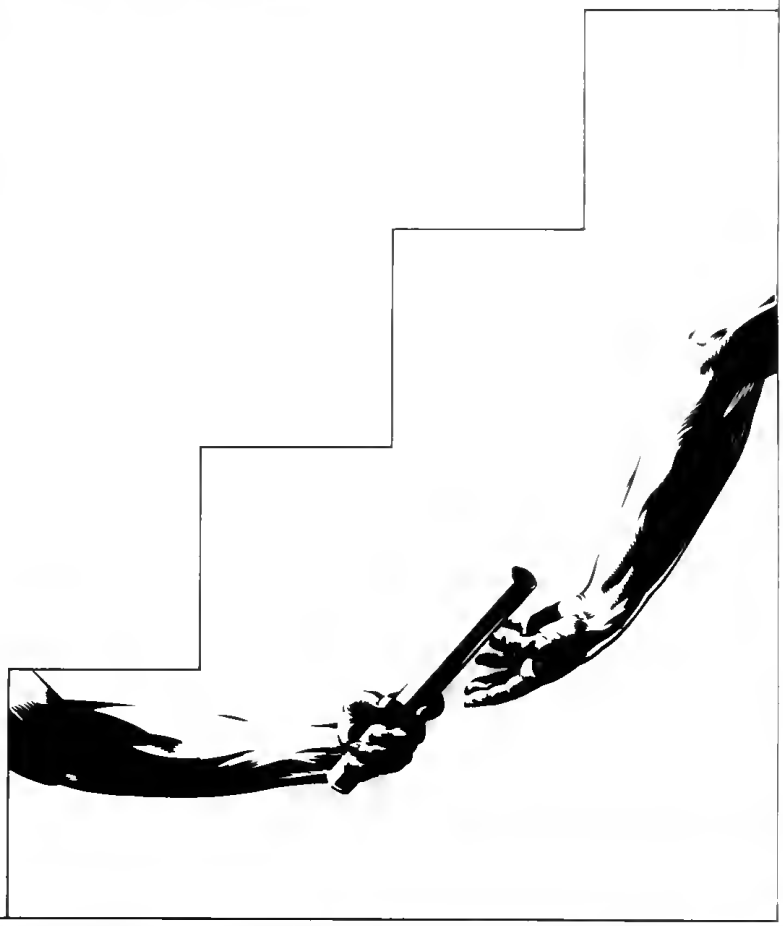
(800) 538-8157, ext. 838
(All states except CA)

(800) 672-3470, ext. 838
(CA only)

If you are unable to call, please send your resume to: National Advanced Systems, Professional Employment, Dept CWSR, MS-66, 800 E. Middlefield Road, Mountain View, CA 94043. We are an equal opportunity employer.

National Advanced Systems

Experts In The Art Of Customer Satisfaction



WE CAN HELP YOU DELIVER JUST IN TIME.

[illegible] importance of just-in-time manufacturing is well [illegible] you [illegible] through with just [illegible] delivery, you're still not competing [illegible] can [illegible] your profit, it's [illegible] that you deliver [illegible] your [illegible] at the [illegible] at the right time.

Management Science America, Inc., can help you effectively [illegible] of [illegible] your business. Our software is designed [illegible] areas [illegible] management, materials manage[illegible] and [illegible] bcs management systems also incorporate the latest [illegible] EDI lets you exchange information continuously with vendors [illegible] purchasing [illegible] times, reduce overall inventory investment, and [illegible]

MSA software works with the software [illegible] already [illegible] Expert®-based open system architecture, our software can [illegible] build on the investment you've already made.

And, finally, nobody else can give you the in-depth [illegible] The best products. The best technology. The best people [illegible] your customers satisfied and improve your profits. Call Robert Carpenter at [illegible]

MSA

© 1990 Management Science America, Inc.